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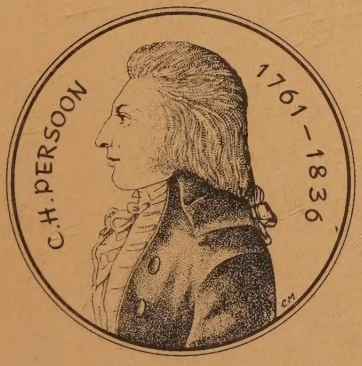
PERSOONIA

A Mycological Journal



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PERSOONIA. A Mycological Journal

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Editors: H. J. LAM, M. A. DONK, R. A. MAAS GEESTERANUS

Publication in PERSOONIA is ordinarily restricted to Members of the Staff of the Rijksherbarium and to authors who work in close co-operation with that Institute. It is devoted to mycology, more in particular to the taxonomy of fungi and lichens.

PERSOONIA came into being by the generous co-operation with the "Nederlandse Mycologische Vereniging" (Dutch Mycological Society) which suspended the publication of its periodical "Fungus (Officieel Orgaan van de Nederlandse Mycologische Vereniging)". In this way PERSOONIA is a continuation of that journal.

PERSOONIA will be published at irregular intervals. If possible two or three Parts will be issued yearly. A volume will contain about 500 pages and may be obtained by subscription or by exchange. Supplement volumes will not be covered by the subscription price, but will be offered to subscribers at a reduced price. Papers are in English, French, or German, or occasionally in Dutch in the case of brief notes.

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PREFACE

The birth of a new scientific periodical deserves a special word of introduction and after twenty-six years of office as a Director of the National Herbarium (Rijksherbarium) I deem it a privilege to hold it at the font.

PERSOONIA, as the new journal has been christened, owes its existence to the co-operation of a private society and a government institute, the first of these being the "Nederlandse Mycologische Vereniging" (N.M.V.) (Netherlands Mycological Society), the second the Rijksherbarium.

This co-operation would not have been possible but for the initiative and the 50 years of activity of the N.M.V. which laid the foundation of Mycology in this country, and furthermore for the untiring enthusiasm and spirit of the present team of mycologists of the Rijksherbarium. It therefore seems appropriate to devote here a few words to the history of both of the present co-operators.

The N.M.V. was established in 1908 by a group of amateurs. Although the Rijksherbarium already possessed some valuable mycological collections, *inter alia* the important collection of Persoon and various exsiccata, there was nobody available to work with them. From 1908 onward the N.M.V. started to make a collection of indigenous fungi and in 1910 it was decided to have this collection put under the management of the Rijksherbarium. In connection with this arrangement the Society took the initiative and gave the impetus to the appointment of an officer in charge.

As such Dr. H. A. A. van der Lek was found prepared to fill the position. His salary, paid by the Society, was shockingly small and in spite of van der Lek's abilities, the Government was not prepared to augment it from her side. Yet Dr. van der Lek continued his work until 1913 when he obtained a better-paid position.

In 1915 he was succeeded by Miss Catharina Cool, an amateur mycologist who started her work at an even lower salary. Only in 1921 did she obtain the humble position of assistant at the Rijksherbarium, which she filled with enthusiasm until her death in 1928. In order to honour and commemorate her work the present series of pamphlets issued by the Society has been named COOLIA.

Miss Cool, who did much field work and had the gift to raise enthusiasm in others, was succeeded by W. J. Lütjeharms, a professional mycologist with historical interests, witness his thesis entitled: "Zur Geschichte der Mykologie. Das XVIII. Jahrhundert" (1936).

During a botanical trip to the Netherlands Indies in 1936 Dr. Lütjeharms was temporarily replaced by (Miss) Dr. J. H. H. van der Meer and in 1938 he accepted a post of Professor of Botany at the University College of Bloemfontein, South Africa, a position he still fills.

His successor, both as a staff member of the Rijksherbarium and as a "conservator" of the N.M.V., was not a trained mycologist, but an algologist, J. S. Zaneveld, who later on wrote a thesis on "The Charophyta of Malaysia and adjacent countries"

(1940). After he left the Rijksherbarium in 1942 he followed his main interests, algology and hydrobiology; his latest position was that of director of the Caribbean Marine Biological Institute at Willemstad, Curaçao.

Zaneveld's successor was R. A. Maas Geesteranus, who, though equally in charge of the Fungi collections both of the Rijksherbarium and of the N.M.V., was primarily interested in lichens. He obtained his doctor's degree on a thesis entitled: "Revision of the lichens of the Netherlands I, Parmeliaceae" (1947).

Dr. Maas Geesteranus continued his lichenological work for several years until it was interrupted by a botanical tour through Africa (1949–1950). After his return he gradually shifted over to pure mycology.

It is due to his efforts that the bonds between the N.M.V. and the Rijksherbarium, which had slackened for some time, were strengthened again and the relationship reorganized. In fact, he prepared the ground for the present situation and enabled me to build up the present team.

I also owe a debt of gratitude to the University authorities for their unfailing interest and generous co-operation in obtaining funds both for a rapid extension of the staff and for working facilities, instruments, and books; particularly the library has considerably increased in size and value. The satisfactory team now available is hoped to succeed in laying the foundation for a high standard institute of mycological taxonomy in this country.

The first man to join the staff was a young mycologist, C. Bas, who started his work in 1954 and who primarily devotes his time to Agaricales.

In 1955 P. Groenhart and H. S. C. Huijsman were admitted as honorary but full-time associates. Both are "amateurs" of high scientific standing, the former in tropical lichenology, the latter in European Agaricales. In 1956 the team received its provisional completion when Dr. M. A. Donk joined it on his return from Java. He continues his nomenclatorial and taxonomical studies and is the obvious leader and teacher of students interested in mycology. The most promising of these is J. van Brummelen, who now prepares a monograph on *Ascobolus* and *Saccobolus* and has introduced experimental methods (cultures) in the institute.

Although there have always been members with enthusiasm and stimulating power, the "Nederlandse Mycologische Vereniging" has never been a flourishing society in the sense that it never succeeded in getting enough money to spend on the publication of a journal of its own. The Dutch as a people have never been mushroom-minded and this is perhaps why mycophily has never gained the popularity it enjoys in some other countries. In spite of this, numerous excursions and exhibitions have been organized by the Society in a most praiseworthy way.

The Society's publications consisted mainly of two series:

a. MEDEDELINGEN VAN DE N.M.V. (Communications of the N.M.V.) Vols. 1–30, 1910–1952; a series of papers which appeared at ever longer intervals and whose contents finally grew so purely scientific that the amateurs among the Society's

members—the majority—were no longer interested. This is why in 1929 a second series was started, entitled:

b. FUNGUS, Vols. 1–28, 1929–1958. In the history of this journal two phases may be distinguished:
1929–1953—first purely written on behalf of and by amateurs and entirely in Dutch, in later years growing more and more scientific;
1954–1958—purely scientific with papers not only in Dutch.

Dr. Maas Geesteranus acted as editor of FUNGUS from 1954–1958. Although the journal was of modest size, its expenditure was much too heavy for the Society's means and, particularly in later years, this has seriously hampered the Society's activities. And since, at the same time, the growing mycological staff of the Rijksherbarium made desirable a more effective means of publication than was so far available, e.g. in BLUMEA, it was the obvious moment to join hands.

This led to the co-operation of which we spoke in the above. In preparing it we were fortunate enough to deal with the actual president of the N.M.V., Mr. G. L. van Eyndhoven, an amateur mycologist of wide knowledge, wisdom, and insight. I wish here to offer him our thanks and appreciation for the tactful way in which he led his members to the acceptance of the bitter conclusion to have the edition of their own periodical ended (carried in the annual meeting of 20 June 1959).

The N.M.V. will of course continue its work, with which we wish it every success. Now that the expenses of the journal no longer burden its budget, the money can be used more effectively for other purposes. As a means of internal communication there is the new series of mimeographed pamphlets issued since 1954 under the name of COOLIA and under the editorship of Mr. Bas. For its scientific products the N.M.V. will, as far as the funds available permit, be given hospitality in the new periodical PERSOONIA, which will be edited by the Rijksherbarium, since government regulations do not allow private financial interference. Yet, in this sense PERSOONIA will be a continuation of FUNGUS.

The choice of the journal's name is self-evident: Persoon[1] is the only non-living mycologist of reputation the Netherlands can claim as a compatriot, even though he was born in the Cape (probably on 1 January 1763, or 31 December 1762 or even 1761) out of a German father (of Dutch nationality) and a Cape-Dutch mother, and even though he spent most of his time outside Holland: from 1800–1836 (the year of his death, 15 November) in Paris. Lütjeharms wrote a short note on his life in VAKBLAD VOOR BIOLOGEN **18**: 42–44. 1936. When the Netherlands' Government in 1825 granted him an annuity, Persoon ceded his collection to the State and ever since its foundation in 1829 the Rijksherbarium has counted it amongst its most precious assets. In addition, Persoon's library is for the greater part at Leiden and the University Library possesses a valuable collection of letters written to Persoon by a great many scientists of his time.

[1] The vignette on the cover was executed by Mr. C. Marks, drawn after Z. Pilzk. **12**: pl. 8. 1933.

I herewith present the new journal to the mycological world with great personal satisfaction and gratitude, entrusting it with confidence to the editors Dr. Donk and Dr. Maas Geesteranus, and expressing the hope that it may occupy an worthy place amongst its elder sisters.

H. J. LAM
Editor-in-Chief.

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ÜBER DIE ASCOMYCETENGATTUNG PLOCHMOPELTIS THEISS.

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(Mit 2 Abbildungen)

Plochmopeltis intricata (Ellis & Mart.) Theiss. wurde in Florida auf Blättern von *Quercus laurifolia* und *Quercus virginiana* var. *virescens* gesammelt. Der oberflächlich wachsende Pilz bildet schildförmige, der Kutikula flach aufsitzende Ascomata ohne Deckschicht. Die Asci sind von den einer hyphigen Basalschicht entspringenden, apikal dunklen und kurz ästig verzweigten Paraphysoiden umgeben. Bei der auf *Olea americana* wachsenden Art *Plochmopeltis ellisii* v. Arx, nov. spec. sind die Paraphysoiden nach oben nur schwach gabelig verzweigt. Die Gattung *Plochmopeltis* Theiss. gehört zu den Schizothyriaceae, einer Familie der Dothiorales (bitunicate Discomyceten).

Mehrere in Nordamerika besonders in Florida auf Blättern von *Quercus laurifolia* Michx. gesammelte Ascomyceten wachsen der Kutikula flach aufsitzend völlig oberflächlich und die meisten dieser Arten wurden von Saccardo (1891) als *Asterella* eingereiht. Diese wurden von Theissen (1912) revidiert und zu verschiedenen Gattungen, z. B. zu *Microthyrium* Desm., *Microthyriella* v. Höhn., *Stomiopeltis* Theiss. oder *Calothyrium* Theiss. gestellt.

Anlässlich einer Revision der zu *Schizothyrium* Desm. gehörenden, bisher meist als *Microthyriella* v. Höhn. eingereihten Pilze (von Arx, 1959) wurden auch die betreffenden auf *Quercus laurifolia* beschriebenen Arten nachgeprüft. Auf einer in der botanischen Abteilung des Naturhistorischen Reichsmuseums in Stockholm bewahrten, als *Asterina intricata* Ellis & Mart. bestimmten Kollektion (ex herb. Sydow, herb. G. Winter, Florida, 1888) wurde dabei ein Pilz gefunden, der nach den von Theissen (1912) und von Petrak (1929) mitgeteilten Beschreibungen von der typischen *Asterina intricata* abweichen musste. Diese auf *Quercus „arenaria"* wachsende Art wurde von Theissen (1912) vorerst als *Microthyriella* eingereiht und später (1914) in eine eigene Gattung *Plochmopeltis* gestellt. Bei ihr sollten sich die Fruchtkörper durch eine maeanderisch gebaute Deckschicht auszeichnen. Anhand der Nachprüfung einer Probe des Originalexemplares wurde diese Gattung von Petrak (1929) wiederum mit *Microthyriella* = *Schizothyrium* vereinigt. Dieser Autor schrieb der Art eine 4–5 μ dicke, plektenchymatisch kleinzellig maeanderisch gebaute, aus 2–3 μ grossen Zellen bestehende Deckschicht zu.

Die eigene Untersuchung von *Asterina intricata* anhand des gesamten Original-Materials (auf *Quercus „arenaria"*, Florida, Green Cove Springs, 13.3.1883, leg. G. Martin, Ellis Collection, New York Botanical Garden) zeigte nun, dass der

Bau dieses Pilzes sowohl von Theissen wie von Petrak verkannt wurde. Die Ascomata besitzen überhaupt keine Deckschicht. Die Gattung *Plochmopeltis* kann bestehen bleiben, muss aber eine neue Diagnose erhalten. Sie ist mit *Schizothyrium* verwandt, unterscheidet sich aber durch die fehlende Deckschicht und durch die eigenartig gebauten Paraphysoiden. Sie kann folgendermassen charackterisiert werden:

PLOCHMOPELTIS Theiss. char. emend. v. Arx

Mycelium superficiale parum visibile, ex hyphis hyalinis vel brunneolis reticulato-ramosis cuticula appressis compositum; ascomata superficialia, dimidiato-scutata vel crustacea; strato basali hyalino vel obscure colorato, ex hyphis ramosis composito; strato tegente nullo; asci parallele dispositi, late clavati vel rotundati, crasse bitunicati; ascosporae clavatae vel fusoideae, circa medio septatae, hyalinae; paraphysoideae numerosae, ex hyphis superne brunneolis et furcato-divisis constantes et epithecium incompletum formantes.

Mycel oberflächlich, unscheinbar, zart, spinnwebartig verzweigt, der Kutikula angepresst; Fruchtkörper oberflächlich, zerstreut, schild- oder flach krustenförmig, im Umrisse rundlich, unscharf begrenzt; Deckschicht fehlend; Asci einreihig parallel stehend, einer hyphigen Basalschicht aufsitzend, dick keulig oder fast kugelig, unten gestielt, mit einer doppelten, nach oben verdickten Membran; Ascosporen länglich oder spindelig, ungefähr in der Mitte septiert, hyalin; Paraphysoiden derbfädig, nach oben sich braun färbend und kurz gabelig oder ästig verzweigend, ein unvollständiges Epithecium bildend.

Die Typusart lässt sich folgendermassen beschreiben:

PLOCHMOPELTIS INTRICATA (Ellis & Mart.) Theiss.

Asterina intricata Ellis & Mart. *in* Amer. Nat., Bot. 69. 1884. — *Asterella intricata* (Ellis & Mart.) Sacc., Syll. Fung. **9**: 395. 1891. — *Microthyriella intricata* (Ellis & Mart.) Theiss. *in* Ann. mycol., Berl. **10**: 190. 1912; Petr. *in* Ann. mycol., Berl. **27**: 351. 1929. — *Plochmopeltis intricata* (Ellis & Mart.) Theiss. *in* Brotéria **12**: 87. 1914.

MATRIX: *Quercus virginiana* Mill. var. *virescens* Sargent (Typuswirt, die Bestimmung als *Quercus »arenaria«* beruht auf einem Irrtum) und *Quercus laurifolia* Michx. (Florida).

Die Ascomata entwickeln sich blattunterseits locker zerstreut oder in kleineren Gruppen aus einem lockeren, der Kutikula anliegenden, spinnwebartig verzweigten Mycel. Dieses besteht aus 2–3,5 μ breiten, zartwandigen, hyalinen oder schwach bräunlichen Hyphen. Indem sich diese stellenweise verdichten entstehen die der Kutikula flach anliegenden, im Umrisse rundlichen, unscharf begrenzten, 260–580 μ grossen Ascomata. Diese besitzen eine zarte, dünne, aus hyalinen Hyphen gebildete Basalschicht, der die Asci und die Paraphysoiden aufsitzen. In den ascusreifen Partien ist die Fruchtschicht 25–35 μ hoch; gegen den Rand ist sie dünner. Die Asci stehen einschichtig parallel nebeneinander und enthalten meist vier, seltener mehr Ascosporen. Sie sind breit keulig, unten in einen verschieden langen Stiel verschmälert, 18–26 μ lang, 10–16 μ breit und besitzen eine doppelte, nach oben stark verdickte Membran. Die als aufsteigende Hyphen ausgebildeten Paraphysoiden sind 20–32 μ lang und 1,5–2,5 μ dick; sie färben sich nach oben braun und sind knorrig ästig verzweigt (Abb. 1, 2a). Von oben gesehen bilden sie ein unvollständiges, körnig krümeliges Epithecium; zwischen ihnen sind die Asci frei sichtbar.

Die hyalinen, zartwandigen Ascosporen sind spindelig, beidends verjüngt, in der Mitte septiert und eingeschnürt und messen reif (ausserhalb der Asci) 12–18 × 3–4,5 μ.

Abb. 1. *Plochmopeltis intricata* (Ellis & Mart.) Theiss.: Schnitt durch eine Partie eines im Zentrum reifen Fruchtkörpers.

Am besten war der Pilz in der eingangs erwähnten, in Stockholm bewahrten Kollektion (auf *Quercus laurifolia*) ausgereift. Am reichlichsten und schönsten entwickelt wurde er auf dem Originalexemplar von *Asterina intricata* beobachtet. Auf einigen Blättern einer dritten Kollektion (auf *Quercus „arenaria"* = *Quercus virginiana* var. *virescens*, Florida, Green Cove Springs, 4.1886, leg Dr. Martin in herb. Ellis) wurde ausser *Plochmopeltis intricata* auch *Microthyriella discoidea* (Ellis & Mart.) Theiss. gefunden. Bei diesem Pilz handelt es sich um eine *Schizothyrium*-Art mit einer zarten, maeanderisch gebauten Deckschicht und ziemlich grossen Ascosporen. Auf andern Blättern wurde noch eine zweite *Schizothyrium*-Art mit kleineren Ascosporen gefunden. Diese hatte ebenfalls eine am Rande maeanderisch gebaute Deckschicht und ist kaum von *Schizothyrium perexiguum* (Rob.) v. Höhn. verschieden. Möglicherweise beruhen die Angaben von Petrak (1929) und von Theissen (1912) über eine maeanderisch gebaute Deckschicht auf der zufälligen Beobachtung einer dieser Arten. Diese lassen sich aber schon durch die Grösse und Form der Ascosporen und der Fruchtkörper leicht von *Plochmopeltis intricata* unterscheiden.

In der Typuskollektion von *Asterina discoidea* Ellis & Mart. befindet sich ausser dem Originalexemplar, bei dem der Pilz auf *Quercus virginiana* wächst, auch ein Blatt von *Olea americana* mit angeblich demselben Pilz. In Wirklichkeit ist dieser von *Asterina discoidea* verschieden und bei ihm handelt es sich um eine zweite Art der Gattung *Plochmopeltis*. Diese soll anschliessend beschrieben werden:

Plochmopeltis ellisii v. Arx, *spec. nov.*

Mycelium hypophyllum, ex hyphis hyalinis, reticulato-ramosis, 1.3–2 μ crassis compositum; ascomata dispersa, dimidiato-scutata, 450–780 μ diam., laete brunnea; asci numerosi, unistratosi, parallele dispositi, late clavati vel ellipsoidei, 22–27 × 19–23 μ; ascosporae oblongae,

paullo supra medium septatae, hyalinae, 13–16 × 4–5 μ; paraphysoideae ex hyphis basalibus oriuntes, 1.5–2 μ crassae, 19–28 μ longae, superne brunneae et furcato-divisae.

Hab. in foliis *Oleae americanae*, in America septentrionali: Florida, Green Cove Springs, 4. 1885, leg. G. Martin (in herb. Ellis).

Die sich blattunterseits ziemlich dicht zerstreut aus einem oberflächlichen, farblosen, der Kutikula anhaftenden Mycel entwickelnden Ascomata sind flach krusten- oder schildförmig, im Umrisse rundlich, hell bräunlich und erreichen bei einer Höhe von 26–34 μ einen Durchmesser von 450–780 μ. Die Basalschicht besteht aus den farblosen, verzweigten, flach niederliegenden, 1,3–2 μ dicken Hyphen des oberflächlichen Mycels. An ihnen entstehen aufsteigende, kurze, 1,5–2 μ breite, bis 28 μ lange, sich nach oben braun färbende und zuletzt meist etwas gabelig verzweigende, oft auch etwas keulig verdickende Hyphen. Zwischen diesen wachsen die ebenfalls der Basalschicht entspringenden Asci heran. Diese stehen ziemlich dicht einreihig parallel nebeneinander, sind ellipsoidisch keulig oder fast kugelig, nach unten in einen verschieden langen Stiel verschmälert, 22–27 × 19–23 μ gross und besitzen eine doppelte, nach oben stark verdickte Membran. Die meist zu acht unregelmässig im Ascus liegenden Ascosporen sind länglich, etwas oberhalb der Mitte septiert, hyalin und 13–16 × 4–5 μ gross.

Abb. 2. a—*Plochmopeltis intricata* (Ellis & Mart.) Theiss.; b—*Plochmopeltis ellisii* v. Arx: Ascosporen und Paraphysoiden.

Diese Art (Abb. 2b) unterscheidet sich von *Plochmopeltis intricata* durch oben etwas weniger stark verzweigte Paraphysoiden, durch im obern Drittel septierte, nicht spindelförmige, sondern vor allem oben breit abgerundete Ascosporen, durch grössere Ascomata und durch ein helleres und spärlicheres, oberflächliches Mycel.

Die Gattung *Plochmopeltis* Theiss. gehört zu den Schizothyriaceae, einer Familie der Dothiorales. Sie steht der Gattung *Schizothyrium* Desm. (vgl. von Arx, 1959) nahe, hat mit ihr die dem Substrat flach anliegenden, schildförmigen, am Rande dünn auslaufenden Ascomata gemeinsam und unterscheidet sich durch die fehlende Deckschicht und die dunklen, oben kurz verzweigten Paraphysoiden. Auch die Gattung *Phillipsiella* Cooke (Syn.: *Microphyma* Speg.) steht *Plochmopeltis* nahe. Die Untersuchung der ebenfalls in Nordamerika auf Blättern von *Quercus* spec. gesammelten Typusart *Phillipsiella atra* Cooke zeigte jedoch, dass bei dieser Art die Fruchtkörper discoid und am Rande scharf begrenzt sind. Sie sind daher der Kutikula nicht schildförmig aufgewachsen. Die länglichen Asci sind von einem durchgehenden, scholligen oder später schleimigen Epithecium bedeckt. Wie die Untersuchung des Originalexemplares zeigte, ist die auf Blättern von *Quercus laurifolia* gesammelte

Asterina patelloides Ellis & Mart. mit *Phillipsiella atra* identisch. Diese am Originalexemplar als *Asterina erysiphoides* Ellis & Mart. (nom. nud.) bezeichnete Form wurde kürzlich von Batista und Nascimento (1958) als *Allosoma quercifoliae* beschrieben und mit guten Abbildungen versehen.

Summary

Plochmopeltis intricata (Ellis & Mart.) Theiss., the type species of the genus *Plochmopeltis* Theiss. occurs on the underside of leaves of *Quercus virginiana* var. *virescens* and *Quercus laurifolia*. The fungus grows superficially, with flattened ascomata which are not covered with a perithecial wall. The asci are surrounded by paraphysoids, which are brown and furcate into short branches at their apices.

A new species, collected on leaves of *Olea americana* is described as *Plochmopeltis ellisii* v. Arx.

The genus *Plochmopeltis* is related to *Schizothyrium* Desm. and *Phillipsiella* Cooke, and should be placed in the Dothiorales.

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NOTES ON THE GENUS SARCOSOMA

K. B. Boedijn
The Hague

In this paper arguments are put forward to show that *Galiella* Nannf. & Korf is in no way different from *Sarcosoma* Casp.

In the subclass of the Discomycetes, the genus *Sarcosoma* has the largest fructifications. The cups of *Sarcosoma globosum* may reach a width of 10.5 cm and a height of 7.5 cm.

Bessey (1), it is true, mentioned on page 196 a *Peziza cacabus*, also known as *Geopyxis cacabus* (Fr.) Sacc., which shows a fruiting structure 3 feet tall, with the cup 20 inches high and 25 inches wide, and the stipe 16 inches high and 3 inches thick. In passing it may be pointed out that this species was not described by Fries but by Ljungh (11) instead, a photocopy of whose paper could be studied through the kindness of Dr. M. A. Donk. From this it is obvious that *Peziza cacabus* surely is not a *Peziza*. The specific epithet '*cacabus*' suggests the Sundanese word 'kakabu', 'supa kakabu' being the name used in West Java for any species of *Calvatia*. *Calvatia gigantea* (Pers.) Lloyd is not rare in Java, but this species, although growing very large, does not fit the description. The plate accompanying the original paper shows an inverted bell-shaped structure provided with a rather long stipe. Although it is impossible to arrive at a satisfactory identification without studying the original material, I would suggest that the specimen depicted is no fungus, not even a plant, but the cup-shaped sponge *Poterion pateri* (Hardwicke) instead. This species neatly agrees with both description and picture.

Returning to the genus *Sarcosoma*, the type species *S. globosum* is still unchallenged in its position of the largest known cup fungus. This species was described in 1797 by Schmidel as *Burcardia globosa*. Fries, however, did not admit this genus, and transferred the species to his genus *Bulgaria*, where it was placed together with such other species as *B. inquinans* which is an inoperculate. Whereas Seaver (12) uses the generic name *Bulgaria* to accomodate the operculate, and *Phaeobulgaria* for the inoperculate species, most recent authors, like Korf (6), prefer *Sarcosoma* for the operculate species. In a second paper this author (7), in collaboration with Nannfeldt, creates a new genus *Galiella* Nannf. & Korf for four of the species out of the previous genus, indicating *Galiella rufa* (Schw.) Nannf. & Korf as the type species. The three remaining species are *G. javanica* (Rehm) Nannf. & Korf, *G. thwaitesii* (Berk. & Br.) Nannf., and *G. celebica* (Henn.) Nannf. It is not clear why *Sarcosoma orientale* Pat. was not incorporated in the new genus.

On carefully reading the generic diagnosis of *Galiella*, it appears that it fits all species of *Sarcosoma* with the exception of *S. globosum*, of which it must be admitted that

it has smooth spores. However, it may be pointed out that in the genus *Sarcosoma* a continuous series of species without and with variously developed spore ornamentations may be found: smooth spores are found in *S. globosum*, moderately developed spore ornamentation occurs in *S. javanicum* and *S. celebicum*, whilst the coarsest markings are to be found in *S. thwaitesii* and *S. orientale*.

According to Korf, *Galiella* would differ from *Sarcosoma*, first, in the callose-pectic markings of the spore-wall and, secondly, in the smaller apothecia which are said to contain no gelatinous fluid.

As to the spore markings, it has been shown above that these are absent only in *S. globosum*.

With regard to the size of the apothecia, this character cannot be accepted as being of generic value. There are numerous genera which include species with both small and large fructifications. Moreover, most species of *Galiella* are nearly as large as *Sarcosoma globosum*. The type species *Galiella rufa*, for one, is about 5 cm in diameter according to Seaver's Plate 56 (12); *G. javanica* is 4–8 cm in diameter and up to 5.5 cm high; *G. celebica* is 2–6.5 cm in diameter and 1–3.5 cm high. These are measurements from collections made in Indonesia which often consisted of a few specimens only. I am, however, convinced that when more material becomes available, still larger apothecia will be found.

Finally, as far as the third character mentioned by Korf is concerned, it is certainly not true that all species of *Galiella* lack a layer of liquid. Fresh specimens of *G. javanica* and *G. celebica* are known to squirt a jet of gelatinous liquid when squeezed, as I often had the opportunity to observe.

Thus, as the alleged differences between *Sarcosoma* and *Galiella* prove unsupported, *Galiella* is a superfluous name and must be rejected.

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THE GENUS ACTINICEPS BERK. & BR.

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(With five Text-figures)

The genus *Actiniceps* Berk. & Br. is shown to be a Basidiomycete. *Wiesnerina* Höhn. and *Dimorphocystis* Corner are regarded synonymous. The type species *A. thwaitesii* Berk. & Br. is redescribed with *D. capitatus* Corner as synonym. The following new combinations are proposed: *A. horrida* (Höhn.) Boedijn, *A. secunda* (Höhn.) Boedijn, *A. laevis* (Corner) Boedijn, and *A. subcapitatus* (Corner) Boedijn.

The genus *Actiniceps* was described by Berkeley & Broome in 1877 for a fungus which they called *A. thwaitesii*, and which was collected on dead coriaceous leaves in Peradeniya, Ceylon. They placed the genus in the Deuteromycetes, family Stilbaceae, as the stipe of the fructification, consisting of parallel hyphae, supported a subglobose head which produced what they thought to be conidia.

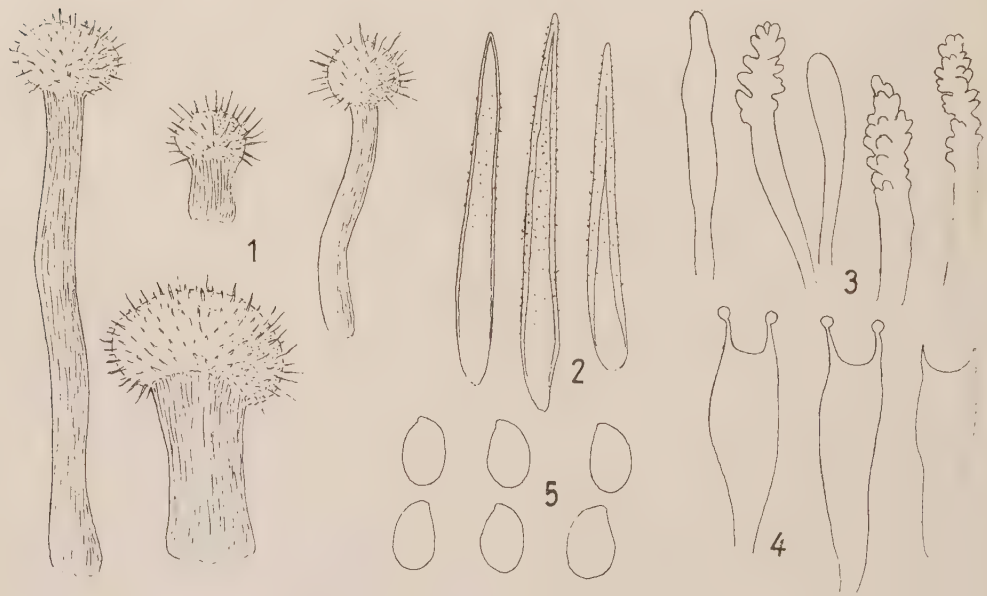
Afterwards *A. thwaitesii* was collected on decaying plant material in the Botanic Gardens, Bogor, West Java. It was mentioned and depicted by Penzig and Saccardo (5) in 1904. A further find on dead leaves of *Ficus elastica* was listed in 1907 by Koorders from Purworedjo, East Java. Finally, another specimen was brought by my former assistant Miss Sri Sabani who collected the fungus on the decaying spatha of a palm in the Botanic Gardens at Bogor.

Superficial determination led to the present species, but a more thorough study revealed the fact that it is no Deuteromycete at all. It is a true Basidiomycete. In order to be quite certain it was felt that a re-examination of the original specimen was needed. This was made possible through the kindness of the Director of the Herbarium at Kew. Renewed study of the type brought to light that (i) the fungus from Bogor is identical with the type specimen of *A. thwaitesii*, (ii) the genus *Actiniceps* belongs to the Basidiomycetes, and, on account of the anatomical characters, to the family of the Thelephoraceae.

Very small thelephoraceous fungi have been described by von Höhnel (3, 4) who placed them in the genus *Wiesnerina* Höhn. On comparing this genus with *Actiniceps*, it appears that they are practically the same. The spines, a very conspicuous character in *Actiniceps*, are an equally striking feature in *Wiesnerina* where they were called cystidia by von Höhnel. The only difference is in the fact that the two species of the last-named genus are either sessile or attenuate at the base, but I can attribute no weight to this difference, since specimens of *A. thwaitesii* with a very short stalk are not rare.

Another genus with which *Actiniceps* should be compared is *Dimorphocystis* Corner (2), to which Dr. M. A. Donk kindly drew my attention. As may be gathered from both the description and drawings, this genus is fully identical with *Actiniceps*. Of the three species described by Corner I assume *D. capitatus* to be the same as *A. thwaitesii*. The description agrees very well with our material except for the basidia which are said to be 4-spored, whereas those in the Bogor specimen were found to be 2-spored. In the latter, basidia were rather scarce, so it may have been purely accidental that there were only found 2-spored ones. It is a well-known fact, after all, that in the Thelephoraceae 2-spored and 4-spored basidia frequently occur in the same specimen.

On the strength of the above considerations both *Wiesnerina* and *Dimorphocystis* are here regarded as synonyms of *Actiniceps*, of which an emended diagnosis is given. Apart from the type species, of which also a redescription will follow, the genus contains at present four more species. Another species, *A. besseyi* Mac Millan, which was found growing on the rind of *Citrus* fruits in North America, seems to be a true stilbaceous fungus, but since no material could be examined, no further comment can be given.



Figs. 1–5. *Actiniceps thwaitesii* Berk. & Br.: 1—various fructifications; 2—cystidia; 3—paraphyses and acanthophyses; 4—basidia; 5—basidiospores.

Actiniceps Berk. & Br.

Actiniceps Berk. & Br. *in* J. Linn. Soc., Lond. (Bot.) **15**: 85. 1877. — Type species: *Actiniceps thwaitesii* Berk. & Br.

Wiesnerina Höhn. *in* Denkschr. Akad. Wiss. Wien **83**: 7. 1907. — Type species: *Wiesnerina horrida* Höhn.

Dimorphocystis Corner, Monogr. *Clavaria* 695. 1950. — Type species: *Dimorphocystis laevis* Corner.

Fructifications sessile, with attenuated base or stalked. Stalk composed of parallel hyphae. Head globose or subglobose, consisting of basidia, paraphyses and acanthophyses, and provided with numerous radiately projecting spine-like cystidia which are more or less thick-walled and incrustate. Sometimes there are also cystidia on the stem. Basidia 2–4-spored. Spores hyaline, ovoid to cylindrical. Acanthophyses hyaline, cylindrical or subventricose, with short outgrowths in the upper portion.

Actiniceps thwaitesii Berk. & Br.

Actiniceps thwaitesii Berk. & Br. *in* J. Linn. Soc., Lond. (Bot.) **15**: 85. 1877. — Type: K.
Dimorphocystis capitatus Corner, Monogr. *Clavaria* 695. 1950. — Type: not seen.

Fructifications short-stalked to very long-stalked. Stalk 90–720 μ long, 42–120 μ wide, but mostly 270–300 × 48–60 μ, composed of parallel hyphae, 5–6 μ wide. Head subglobose, sometimes flattened, bristling with spines placed in alle directions, at first white, afterwards pale yellowish, 114–240 μ diam., the spines not counted, but mostly 120–132 μ diam. Spines projecting far beyond the tissue of the head, 95–129 μ long, 9–13 μ wide at the base, tapering to a rather sharp point at the tip, at first thin-walled, with the cell-wall 1–4 μ thick, afterwards with the cell-wall thickened to 5 μ and incrustated with crystals, in old specimens even with the lumen nearly obliterated. Tissue of the head consisting of paraphyse-like hyphae, 4–6 μ wide, among which the basidia and acanthophyses are to be found. Basidia very delicate, subcylindrical, attenuated near the base, 18–22 μ long, 6·7 μ wide at the top, 2-spored. Sterigmata 3–4 μ long, 1–2 μ broad at the base. Spores colourless, ovoid, with indistinct lateral apiculus, 6 7.5 × 4–5 μ. Acanthophyses 3.5–5 μ broad, in the upper part densely beset with 1–2 μ wide outgrowths.

Known from Ceylon, Malaya, Java, on vegetable debris.

Briefly enumerated, the following species belong to *Actiniceps*, viz. **A. horrida** (Höhn.) Boedijn, *comb. n.* (basinym: *Wiesnerina horrida* Höhn. *in* Denkschr. Akad. Wiss. Wien **83**: 7. 1907), from Brazil, on dead plant material; **Actiniceps secunda** (Höhn.) Boedijn, *comb. n.* (basinym: *Wiesnerina secunda* Höhn. *in* Sitzber. Akad. Wiss. Wien **121**: 342. 1912), from Java, on dead palm leaves; **Actiniceps laevis** (Corner) Boedijn, *comb. n.* (basinym: *Dimorphocystis laevis* Corner, Monogr. *Clavaria* 695. 1950), from Malaya, on dead leaves of *Eugenia cerina*; **Actiniceps subcapitatus** (Corner) Boedijn, *comb. n.* (basinym: *Dimorphocystis subcapitatus* Corner, Monogr. *Clavaria* 695. 1950), from Malaya, on dead leaves of *Eugenia cerina.*

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ON A NEW FAMILY OF THE SPHAERIALES

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(With three Text-figures)

Renewed study of the type material of species formerly described under *Xylaria* necessitates the recognition of a new family, for which the name Sarcostromellaceae Boedijn is proposed. This family comprises two new genera, *Sarcostromella* Boedijn and *Pseudoxylaria* Boedijn. *Sarcostromella polysticha* (Penz. & Sacc.) Boedijn and *Pseudoxylaria nigripes* (Kl.) Boedijn are new combinations, *S. amorpha* Boedijn is a new species. *Xylaria xanthophaea* Penz. & Sacc. appears identical with *S. polysticha*. *Xylaria torrubioides* Penz. & Sacc. is a synonym of *Pseudoxylaria nigripes*.

Among the Sphaeriales, the Xylariaceae take a prominent position, one of the chief characters being the presence of a long germ slit in the wall of the one-celled, dark coloured spores. The shape of the fructification is one of the main distinguishing features of the genus *Xylaria*; it always is an elongated, erect, simple or branched stroma which is either cylindrical, or more or less flattened, or club-shaped, and which bears the perithecia in a single layer. The latter are wholly immersed, more or less erumpent, or sometimes even nearly free. The consistency of the stroma is typically corky.

On account of their general shape, some species have been placed in *Xylaria* to which they certainly do not belong. Already von Höhnel (1) declared *Xylaria nigripes* to be entirely different from the typical species of that genus, noteworthy differences being the soft texture of the stroma, the very small spores, and the absence of a germ slit. Two other aberrant species, *Xylaria polysticha* and *X. xanthophaea*, were described by Penzig & Saccardo (2, 3, 4). However, examination of the type material, preserved in the Herbarium of the Botanical Gardens at Bogor, revealed that, firstly, *X. xanthophaea* is identical with *X. polysticha*, and, secondly, the latter is no true *Xylaria* either, since it is characterized by a fleshy and rather pale stroma, wholly immersed perithecia at several depths, and very small spores. Apart from this species, a second and closely related species was found at Bogor which seems undescribed. Both constitute a new genus, for which the name *Sarcostromella* is proposed. To accomodate *Xylaria nigripes* it is equally necessary to erect a new genus which is hereby called *Pseudoxylaria*. Both genera have to be removed from the Xylariaceae and ranged in a new family, the Sarcostromellaceae.

Sarcostromellaceae Boedijn, *nov. fam.*

Stromata carnosa vel subcarnosa, hemisphaerica, substipitata vel cylindrica saepe compressa, brunnea vel nigra. Perithecia ovata, mono- vel pluristicha, immersa. Ostiola omnia immersa vel prominula. Asci numerosi, cylindracei, octospori, paraphysibus destituti. Sporae uniseriatae, minutissimae, ellipsoideae vel amygdalinae, atrobrunneae, plerumque poris germinativis minutis praeditae.

Typus familiae: *Sarcostromella* Boedijn.

Fructifications fleshy to cartilaginous, variously shaped, either globose to flattened, sometimes weakly lobed and attenuate at the base into a more or less distinct stipe-like structure, or elongate, cylindrical and often slightly compressed, some shade of brown to nearly black. Perithecia ovoid to subangular, either in a single layer just beneath the cortex, or at several depths and deeply immersed. Ostioles long and canal-like or short and more or less protruding. Asci very numerous, filling nearly the whole inside of the perithecia, cylindrical, 8-spored. Spores very small, ellipsoid to almond-shaped, brown to blackish brown, with or without a minute germ pore.

Sarcostromella Boedijn, *nov. gen.*

Stromata hemisphaerica substipitata vel cylindrica, interdum compressa, carnosa, ochracea vel fulva. Perithecia profunde immersa, 3-6-sticha, ostiolis totis immersis. Asci numerosi, cylindracei, octospori, paraphysibus destituti. Sporae uniseriatae, minutissimae, amygdalinae, atrobrunneae, poris germinativis minutis praeditae.

Typus generis: *Sarcostromella polysticha* (Penz. & Sacc.) Boedijn.

Fructifications hemisphaerical, sometimes weakly lobed, somewhat flattened and substipitate, or cylindrical and often slightly compressed, fleshy, ochraceous to brown. Perithecia ovoid to subangular, wholly immersed and arranged at three to six depths, this number diminishing further downwards to two or one near the stipe. Ostioles long, canal-like and wholly immersed or protruding. Asci very numerous, cylindrical, 8-spored. Paraphyses absent. Spores 1-seriate, very small, almond-shaped, blackish brown, with very small germ pore at pointed end.

Since the walls of the old asci dissolve, the perithecia soon get filled with spores, but these are driven out through the ostioles by the new asci which are constantly being formed. The spores may be washed away from the surface of the fructification by rain, or perhaps insects act as distributing agents.

Sarcostromella polysticha (Penz. & Sacc.) Boedijn, *nov. comb.*

Xylaria polysticha Penz. & Sacc. *in* Malpighia **11**: 500. 1897. — Type: Java, Tjibodas (BO).
Xylaria xanthophaea Penz. & Sacc. *in* Malpighia **15**: 226. 1902. — Type: Java, Tjibodas (BO).

Fructifications cylindrical or club-shaped, mostly slightly compressed and with a more or less distinct stipe-like portion, at first brown, darkening with age, 2–5 cm long, the fertile part 7–12 mm, the stalk 4–7 mm wide. Perithecia at three to four depths, broadly ellipsoid, 400–690 × 370–460 μ. Perithecial wall very prominent, brown, 34–57 μ thick, consisting of brown, elongated cells, 2–4 μ wide. Ostioles canal-like, 80–138 μ diam., those of the deep-seated perithecia up to 1 mm long, mostly wholly filled with spores. Asci very numerous, filling nearly the whole inside of the perithecia, cylindrical, 8-spored, 42–50 × 4.5–6 μ. Spores uniseriate, very small, 5–7 × 3–4 μ, blackish brown, almond-shaped, with a minute germ

pore at the pointed end. Stroma of a typical fleshy structure, compactly plectenchymatic, colourless to somewhat tinted in the centre, consisting of moderately thick-walled to thick-walled hyphae, 2–6 μ diam., towards the surface with a brown layer of 60–80 μ.

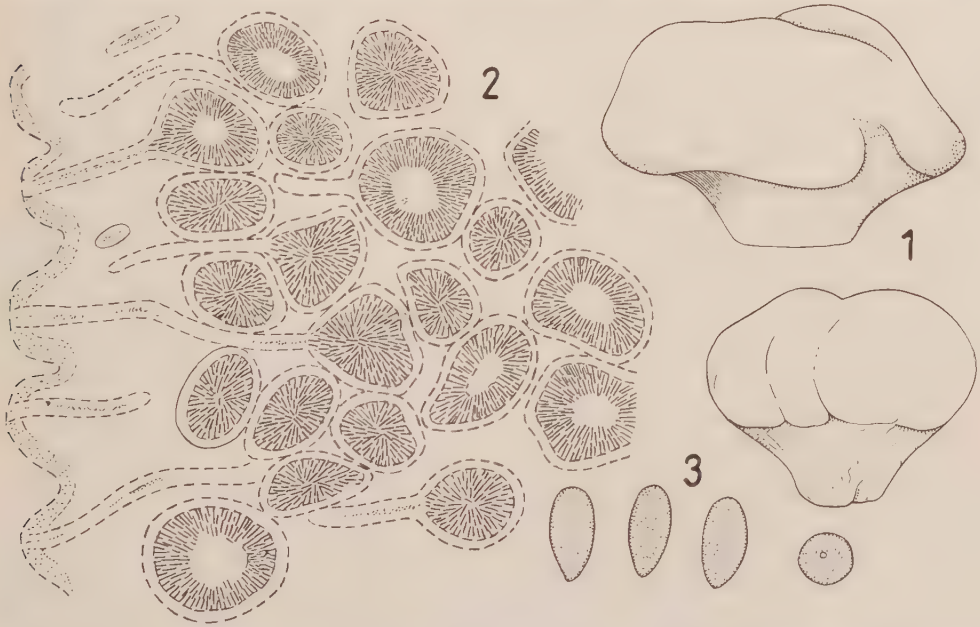
MATERIAL EXAMINED.—Java, Tjibodas, on wood, 1899, *Penzig*; Oct. 1938, *Boedijn 3305*; Nov. 1952, *Hoogland* (BO).

Sarcostromella amorpha Boedijn, *nov. spec.*

Stromata hemisphaerica, depressa, substipitata, 3–6 cm lata, 2.5–4 cm alta, sordide ochracea, carnoso-coriacea. Perithecia profunde immersa, 3–6-sticha, ellipsoidea vel subangularia, 400–700 × 300–500 μ. Ostiola usque ad 3 mm longa, 80–100 μ diam. Asci numerosi, cylindracei, octospori, 34–46 × 4–6 μ. Sporae uniseriatae, atrobrunneae, amygdalinae, 6–8 × 3.5–4 μ, poris germinativis minutis praeditae.

Typus: Java, Tjibodas, *Bruggeman 8851* (BO).

Fructifications irregularly tuberiform, with a more or less distinct stipe-like base, ochraceous, darkening on drying, 3–6 cm wide, 2.5–4 cm high, solid, becoming hollow when old. Surface finely granulated under a hand lense, each granule being the terminal of an ostiole. Perithecia at three to six depths, this number diminishing further downwards to two or one near the base, broadly ellipsoid to subangular, 400–700 × 300–500 μ. Perithecial wall 20–40 μ thick, very conspicuous even though nearly concolorous with surrounding stromatic tissue, consisting of rather indistinct, elongated cells of about 2 μ wide. Ostioles 80–100 μ wide, especially



Figs. 1–3. *Sarcostromella amorpha* Boedijn: 1—fructifications; 2—peripheral part of section, showing various depths of perithecia; 3—spores, one of which is shown from above to show the germ pore.

those of the deep-seated perithecia up to 3 mm long. Asci very numerous, filling nearly the whole inside of the perithecia, cylindrical, 8-spored, 34–46 × 4–6 μ. Spores uniseriate, small, 6–8 × 3.5–4 μ, blackish brown, almond-shaped, with a minute germ pore at the pointed end. Stroma fleshy-coriaceous, becoming very hard when dried, compactly plectenchymatic, weakly coloured, darkening on drying, consisting of moderately thick-walled hyphae, 4–6 μ diam.

MATERIAL EXAMINED. — Java, Tjibodas, on wood, Sept. 1924, *Bruggeman 8851* (BO).

Pseudoxylaria Boedijn, *nov. gen.*

Stromata cylindracea, simplicia vel parce ramosa, subcarnosa vel cartilaginea, stipite gracili, flexuosa, parte basali saepe sclerotiiformi. Perithecia monosticha, ostiolis prominentibus. Asci numerosi, cylindracei, octospori, paraphysibus destituti. Sporae uniseriatae, minutissimae, ellipsoideae, atrobrunneae, poris germinativis nullis.

Typus generis: *Pseudoxylaria nigripes* (Kl.) Boedijn.

Fructifications long, cylindrical, simple, rarely branched, somewhat fleshy to cartilaginous. Stalk greatly elongated and hidden in the soil, often springing from a sclerotium. Perithecia in a single layer just beneath the cortex, with protruding ostioles. Asci numerous, cylindrical, 8-spored, without paraphyses. Spores uniseriate, very small, ellipsoid, blackish brown, without a germ pore.

Pseudoxylaria nigripes (Kl.) Boedijn, *nov. comb.*

Sphaeria (*Cordyceps*) *nigripes* Kl. *in* Linnaea **7**: 203. 1832. — *Xylaria nigripes* (Kl.) Sacc., Syll. Fung. **9**: 527. 1891. — Type locality: "India orientalis".

Xylaria torrubioides Penz. & Sacc. *in* Malpighia **11**: 496. 1897. — Type: Java, Bogor (BO).

Fructifications elongate, cylindrical, rarely branched, 4–15 cm long, 1–6.5 mm wide, at first murky brown, soon becoming sooty. Stalk elongated into a root-like structure, hidden in the soil, up to 8 cm long, often springing from a large sclerotium. Perithecia in a single layer just beneath the cortex, globose to broadly ellipsoid, 345–450 × 242–400 μ, with protruding ostioles. Perithecial wall neatly defined, 11–15 μ thick, consisting of brown, flattened cells, 2–4 μ wide. Asci numerous, cylindrical, 8-spored, 48–54 × 4–5 μ, covering bottom and sides of the perithecia. Spores very small, 5–6.5 × 2.5–3 μ, blackish brown, ellipsoid, without a germ pore. Stroma somewhat fleshy to cartilaginous, plectenchymatic, brown in the centre, white near the periphery, consisting of rather thin-walled hyphae, but also mixed with some thick-walled, often tortuous threads of 3–6 μ diam. Cortex thin, brown, 11–23 μ. Preceding the formation of the perithecia, the stroma is covered with a palisade layer of conidiophores which produce the conidia, but these disappear when the perithecia are being developed. Conidiophores up to 25 μ long, 1.5–2 μ wide. Conidia colourless, 2.5–5 × 1.5–2 μ.

On old, deserted termite nests, known from Ceylon and Java, and probably occurring throughout the Malayan region.

Whether the present species always grows on termite nests is not known with certainty, since the root-like stem connecting the fungus with the nests is easily broken. Also, it is not clear for the same reason whether all fructifications arise from a sclerotium. To make sure about this, one would have to dig up the nests, but the undertaking is a difficult one which rarely yields success, since the nests are often deeply lodged. Once, after a nest had been excavated, 24 sclerotia were

found. These were blackish, globose or limoniform to ellipsoid, 2–7 × 1.5–5.5 cm.

Xylaria torrubioides Penz. & Sacc. is identical with the present species, but was based on poorly developed specimes, as could be ascertained by an examination of the type.

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A SPECIES OF SEPTOBASIDIUM SHEDDING ITS IMMATURE BASIDIA

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The Hague

(With five Text-figures)

A new species of *Septobasidium* is described, in relation with which the position of the genus *Uredinella* is discussed.

On two occasions a *Septobasidium* was found which on microscopical examination showed large numbers of free basidia. It could be demonstrated that these break off from the probasidia when still in the unseptate condition. Afterwards septa are formed, after which each cell produces a basidiospore on a short sterigma. As the species seems new, the following description is given.

Septobasidium planum Boedijn, *nov. spec.*

Fructificatio resupinata, hypophylla, suborbiculata, 7–22 mm diam. Margo plana, pallide brunnea, media elevata, usque ad 1 mm alta, fusca, ex hyphis solitariis vel fasciculatis erectis, brunneis, septatis, crasse tunicatis, 7–8 μ diam. formata. Probasidia pedicellata, globosa, pallide brunnea, 15–18 μ diam. Basidia recta, simplicia, decidua, deinde 3-septata, 53–65 × 6.5–10.5 μ. Sterigmata 4–5.5 × 1.5–2.5 μ. Sporae fabiformes, 15–20 × 6–7 μ.
Typus: Java, Bogor, Hortus botanicus, Sept. 1956 (Herb. Boedijn).

The colonies are rounded to irregular in outline, 7–22 mm across, bordered by a typical, very flat margin which is greyish brown (about wood brown, Ridgw.), 1–7 mm, usually 4–5 mm, broad. In the centre more or less erect threads and fascicles of threads form slightly elevated portions which cover the scale insects upon which the fungus grows. Sometimes there are a number of such raised parts which are dark brown (about natal brown, Ridgw.), irregular in shape or with a lobed outline, 3–7 mm across.

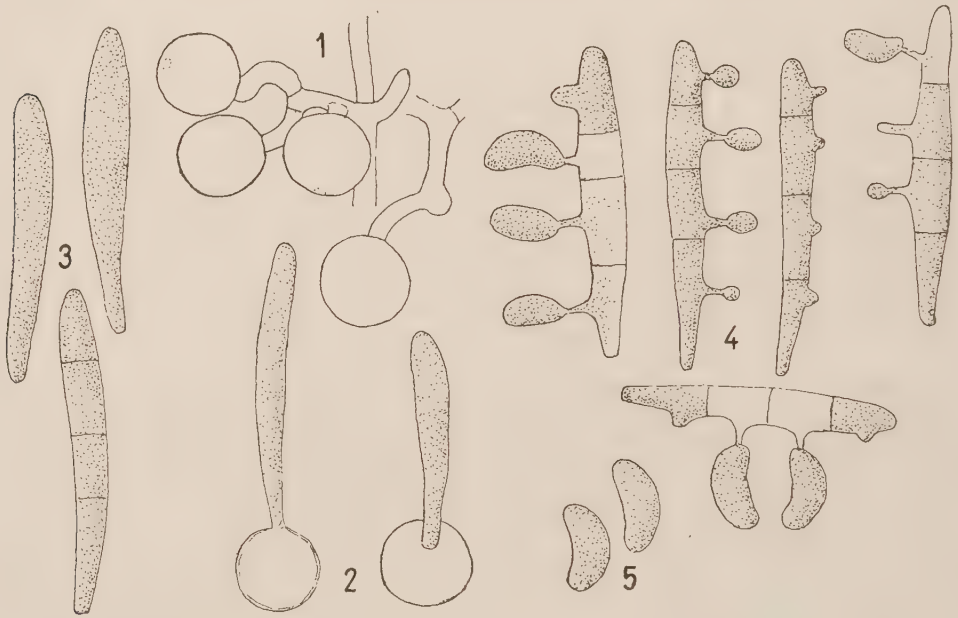
The border consists of a 15–20 μ thick layer made up of pale brown, much branched and septate hyphae which are 3–5 μ wide. In the central part the basal layer over the scale insects becomes 50–120 μ high, with the darker threads almost forming a mat. The erect threads and fascicles of threads are up to 1 mm high. The separate hyphae are dark reddish brown, septate, and very thick-walled, 7–8 μ wide, with the cell-wall up to 4 μ thick. In many places the threads coalesce to form 24–27 μ broad fascicles. Sometimes two or more smaller fascicles unite near their tips to form one large fascicle. The scale insects are penetrated by large, much branched, hyaline haustoria, the branches of which are 2–3 μ broad.

The margin contains numerous probasidia, and to a lesser extent these are also found in the central part. The probasidia are round, pale brown, 15–18 μ across, with slightly thickened cell-wall, and with a germ pore 3–4 μ wide. Sometimes a new probasidium is formed by proliferation within the old and empty one. The

probasidia develop long, club-shaped, straight basidia measuring 53–65 × 6.5–10.5 μ. These are shed and dispersed when still in the one-celled state. Afterwards, the free basidia form cross-walls, becoming 4-celled. Each cell sends out a sterigma which is 1.5–2.5 μ broad at its base and 4–5.5 μ long, bearing one basidiospore. Spore-formation which often is not simultaneous, is brought about in that the whole protoplasmatic contents of each cell passes into the spore. The spores are fabiform with rounded ends, 15–20 × 6–7 μ.

Java, Bogor, Botanical Gardens, Sept. 1956 (type), Oct. 1957.

On scale insects on the underside of coriaceous leaves, most probably of a *Cinnamon* species.



Figs. 1–5. *Septobasidium planum* Boedijn: 1—probasidia; 2—germinating probasidia; 3—free unseptated basidia; 4—various stages of development of basidia; 5—spores.

From the above description it is evident that the present species has much in common with representatives of the genus *Uredinella* as described by Couch. In species of this genus the basidia are also known to break easily off from the probasidia which were called teleutospores by Couch. It is on account of these teleutospores and perhaps a second type of spores, interpreted as uredospores, that *Uredinella* was believed to have connections with the Uredinales. Especially the so-called uredospores need commenting here. They germinate from probasidia in the same manner as in ordinary basidia, and are shed as long, non-septate, cylindrical bodies. The comparison, however, with true uredospores does not hold, for, as is well known, these structures have the appearance of probasidia, and on germinating produce a mycelium. From the description it is at once clear that the uredospores

in *Uredinella* merely represent young basidia. In addition to the two kinds of spores, the poorly developed sterile tissue in the fructification of *Uredinella* was thought to be of importance, since in the sori of many of the Uredinales sterile tissue is even lacking. However, the resemblance of both the sterile tissue and the spores is of a superficial nature only, not at all adequate to establish a connection between *Uredinella* and the rusts.

With regard to the relation between *Uredinella* and *Septobasidium*, the only difference is in the fact that the fructifications of the former grow on a single scale insect, whereas those of the latter cover whole colonies of the animals. This, however, would hardly seem sufficient to maintain *Uredinella* as a separate genus.

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NOTES ON 'CYPHELLACEAE'.—I

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The author regards the Cyphellaceae as an artificial family. He redefines it for practical purposes, suggesting the gradual removal of those elements that show relationship with other groups; several elements are referable to the Corticiaceae or the agarics. A list of the 'cyphellaceous' generic names tentatively included is given. The genera to be excluded from the family as defined are briefly discussed. The same applies to a long series of specific names that had or have been included. A historic chapter reviews some important developments in regard with some of the older genera, *Solenia*, *Cyphella*, *Aleurodiscus*, as well as the rise of the family. Some species are transferred to *Aleurodiscus* Rab. ex J. Schroet.; *Cytidia* Quél. is redefined and *Auriculariopsis* Maire excluded from it. Other genera reviewed and redefined are *Stromatoscypha* Donk [*Porotheleum* (Fr. per Fr.) Fr.], *Chromocyphella* De Toni & Levi [*Phaeocyphella* Pat.], and *Lachnella* Fr. Two new monotypic genera are introduced, *Cellypha* Donk and *Pellidiscus* Donk. One or more species of the redefined and new genera are discussed. The name *Mycena* sect. *Hirsutae* (Kühner) ex Donk is validly published. Several specific names are reduced to the synonymy of other species for the first time. Several types of names published by Persoon and by von Albertini & von Schweinitz were studied. New combinations are made under *Hymenochaete* Lév. (1), *Favolaschia* (Pat.) Pat. (1), *Aleurodiscus* (2), *Cellypha* (1), *Pellidiscus* (1), *Chromocyphella* (1).

Introduction.—A recent development in connection with the study of the 'Cyphellaceae' is a paper published by W. B. Cooke (*1957*) entitled, "The Porotheleaceae: *Porotheleum*". It will be followed by a second dealing with "*Solenia*, *Phaeosolenia*, *Leptotus* and *Chromocyphella*". Cooke seems to consider all these genera sufficiently related to be combined into a natural family. I confess from the start that I do not at all concur with this view and that I consider most of these genera not only completely unrelated but also highly artificial. A point in case is Cooke's emendation of *Porotheleum* (Fr. per Fr.) Fr. (= *Stromatoscypha* Donk). He combines into this genus, for instance, both *Stromatoscypha fimbriatum* (Pers. per Fr.) Donk and *Solenia poriaeformis* (Pers. per Mérat) Fuck. The two have so little in common that, in my opinion, they should go into different families. On the other hand, Cooke does not include in *Porotheleum* the nearest relatives of *Solenia poriaeformis*, like *Cyphella cupulaeformis* Berk. & Rav. apud Berk. and other species, which, I think, must be placed with it in one genus.

In the present series of notes I hope to develop gradually the thesis that the 'Cyphellaceae' are a heterogeneous assemblage of more or less 'reduced' taxa

pertaining to different families from various quarters of the Hymenomycetes: Corticiaceae, several families of Agaricales, Schizophyllaceae (which should probably not be included in the Agaricales at all), and perhaps still others.

ACKNOWLEDGEMENTS.—I am very much indebted to the directors and curators of the cited herbaria for the loan of important specimens under their care or for facilities extended during visits to their institutes. I also wish to acknowledge the help of Drs L. Weresub and R. W. G. Dennis in correcting the English text of the manuscript.

1.—DEFINITION AND CONTENTS OF THE CYPHELLACEAE

W. B. Cooke (*1957*: 681) stated that "the use of the name Cyphellaceae has never been completely validated. Pilát uses it in several publications." Therefore, he felt obliged to replace the name Cyphellaceae by the name Porotheleaceae Murrill ("Porotheliaceae"). However, the situation is not as bad as that: those authors who believe that there exists a natural group of genera, like the one Cooke calls Porotheleaceae, may drop this name again and return to the more familiar one of Cyphellaceae, which was validly published more than once prior to Murrill's name. It may be pointed out that Pilát never claimed to have introduced it himself, but if there had been no previous validation, his repeated publication of the name could constitute validation many times over, since in several cases it was accompanied by a description or a reference to one.

CYPHELLACEAE Lotsy

Matulales Mass. *in* J. R. micr. Soc. II **8**: 176. 1888 ("Matuleae"; nomen anamorphosis). — Type: *Matula* Mass.

Cyphellei J. Schroet. *in* Krypt.-Fl. Schles. **3** (1): 433. 1888 (as a "Gruppe" below the rank of a family). — Cyphelleae Killerm. *in* Nat. PflFam., 2. Aufl., **6**: 149. 1928 (tribus). — Type: *Cyphella* Fr.

[Sous-tribus Cyphellés: Pat., Essai taxon. Hym. 51, 52. 1900.]

[Famille des Cyphellacées: Maire *in* Bull. Soc. mycol. France **18** (Suppl.): 99. 1902. —] Cyphellaceae Lotsy, Vortr. bot. Stammesgesch. **1**: 695, 696. 1907; Herter *in* KryptFl. Mark Brandenb. **6**: 132. 1910.

[Tribu des Cyphellées: Maire *in* Bull. Soc. mycol. France **18** (Suppl.): 101. 1902. —] Cyphelleae Lotsy, Vortr. bot. Stammesgesch. **1**: 696, 698. 1907. — Type: *Cyphella* Fr.

Porotheleaceae Murrill *in* Mycologia **8**: 56. 1916 ("Porotheliaceae"). — Type: *Porotheleum* Fr.

Aleurodiscinae Pilát *in* Ann. mycol., Berl. **24**: 206. 1926 (subtribus?). — Aleurodisceae (Pilát) Killerm. *in* Nat. PflFam., 2. Aufl., **6**: 142. 1928 (tribus; "Aleurodiscineae").[1] — Type: *Aleurodiscus* Rab. ex J. Schroet.

Cyphelloideae Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 127. 1931; G. Cunn. *in* Trans. roy. Soc. New Zeal. **81**: 173. 1953 (without Latin description). — Type: *Cyphella* Fr.

Leptotaceae Maire *in* Treb. Mus. Ciènc. nat. Barcelona **15** (Sèr. bot. 2): 52. 1933 & *in*

[1] Pilát introduced this taxon as a "Gruppe" below the rank of a family using the termination of a subtribus for the name. Killermann also calls it Aleurodiscineae, but gave it the rank of a tribus; he thus used an incorrect termination.

Publ. Inst. bot., Barcelona **3** (4): 58. 1937 (nomen nudum); Sing. *in* Lloydia **8**: 188. 1945 (without Latin description). — Type: *Leptotus* P. Karst.

Cyphellineae Bond. & Sing. *in* Ann. mycol., Berl. **39**: 44, 45. 1941 (subordo; nomen nudum). — Type: *Cyphella* Fr.

DEFINITION.—Homobasidious hymenomycetes. Fruit-body cup- to disk-shaped or tubular, dorsally attached by a constricted base, sessile to stalked, small (at most up to one or a few mm, rarely exceeding 1 cm in diameter); numerous fruit-bodies may be crowded on a resupinate 'stroma'. Hymenium lining the concave (or at most flat) 'disk', smooth and even (rarely more or less wrinkled to folded), not compounded by partitions sterile on edge.

TYPE.—*Cyphella* Fr.

One will easily call to mind several instances of species answering to this definition, but yet not included to-day even by supporters of the 'family': compare *Mycobonia disciformis* G. Cunn., *Plicatura* Peck; *Corticium evolvens* (Fr. per Fr.) Fr., as originally conceived; *Stereum* Pers. per Fr. *sensu stricto*, which consists essentially of species with dorsally attached fruit-bodies; individual fruit-bodies of *Merulius tremellosus* Schrad. per Fr. like those that have been placed in a distinct genus (*Trabecularia* Bon.).

In the above definition of the 'family' I have stipulated that the hymenium is not compounded by partitions sterile on edge, to exclude such genera as *Favolaschia* (Pat.) Pat. apud Pat. & Lagerh., *Resupinatus* (C. Nees) per S. F. Gray. The first of these genera possesses a hymenophore that may be said to consist of tubes as in the polypores, although in some species these are usually few, the others are more or less typically lamellate and are better regarded as agarics. *Schizophyllum* Fr. per Fr., with its peculiar 'gills' is also to be excluded.

The definition further excludes genera with convex hymenium (*Pistillina* Quél., *Wiesnerina* Höhn.) or with fertile warts (*Punctularia* Pat. apud Pat. & Lagerh.); with fruit-bodies laterally stalked (*Leptoglossum* P. Karst., *Stereophyllum* P. Karst.); and with tubes ('fruit-bodies') on a laterally stalked fruit-body ('stroma') (*Fistulina* Bull. per Fr.).

Moreover, such genera as have drifted into the 'family' by obvious misconceptions or some far-fetched interpretation of characters should not be admitted either: *Hypolyssus* Pers. sensu Berk. (= *Caripia* O.K.), *Dacryobolus* Fr., *Trogia* Fr., *Chlorocyphella* Speg. A more detailed review of the excluded genera will be found below.

CONTENTS.—For an annotated enumeration of the generic names proposed for the 'Cyphellaceae', see Donk (*1951*). "Additions and corrections" to the cited paper will be published shortly after the Congress at Montreal.

I would now add to the list of cyphellaceous genera *Arrhenia* Fr. (type species, *Cantharellus auriscalpium* Fr.; cf. Donk, *1957a*: 19). Until a few years ago the type species was so little understood that it was not at all certain that it was correctly identified when redescribed, for instance, by Patouillard (*1900*: 130 *f. 63*). Recent descriptions and illustrations published by Pilát (*1951*: *fig.* on p. 444; *apud* Pilát & Nannf., *1955*: 33 *f. 14*) and Favre (*1955*: 36 *f. 13*, *pl. 4 f. 3*) demonstrate that the

young fruit-body is erect, stalked and infundibuliform, and that the cup gradually develops asymmetrically, exposing the disc laterally and even downwards. Such a fruit-body is reminiscent of one of *Geotus* Pilát & Svrček (*1953*: 9) but in that genus the cap is strictly laterally attached to the stalk. It has also become necessary to compare *Arrhenia* with *Rimbachia* Pat. for from Singer's description (*1945*: 186) of *Rimbachia paradoxa* Pat. (the type species of Patouillard's genus) no striking differences are evident. Moreover, the position of *Arrhenia pezizoidea* (Speg.) Sing. (l.c.) should come under renewed consideration. Attention is also drawn to a few species described from Europe which ought to be considered in connection with *Arrhenia*, like *Cyphella cochlearis* Bres.

The following list of generic names is based on species supposed here to fall within the limits of the present 'family' (see Table I).

REGIONAL CONTRIBUTIONS.—As a rule the 'Cyphellaceae' have not been favoured by mycologists. Those who paid attention to them generally did so fleetingly by describing new species that are often unrecognizable from their too short descriptions (Berkeley, Cooke, Hennings). Such careless work has led to a vast number of species among which nobody can find his way without access to the types.

As in several other genera of minute hymenomycetes, Patouillard (*1883–9*) has done important work in this case for France. This country has also been lucky in having a valuable account of many of its species by Bourdot & Galzin (*1928*). Pilát (*1924–1925a–c*) studied the group for Czecho-Slovakia, describing several new species and including a chapter on ecological and phytogeographical aspects (Pilát, *1925b*: 31–35). Scattered but noteworthy contributions were published by Petch for Ceylon, while Burt (*1914, 1924, 1926*) has done much to give a more up-to-date account of the North American species. Recently W. B. Cooke published on the genera *Cytidia* (*1951*) and *Porotheleum* (*1957*).

Like so many other groups of fungi, the cyphellas are in urgent need of careful work by local collectors and by monographers.

2.—SOME HISTORICAL REMARKS

Solenia and *Cyphella*.—The fathers of mycology, who made only incidental use of the compound microscope, were fully aware that most cup-fungi had asci, but hardly that a few species had different bodies of spore-production. Neither Persoon, nor Fries in his earlier work, understood much about these organs. The basidia especially, which Micheli had seen long before, appeared to be a problem to them. In those times it could hardly be expected that the cup-fungi with asci and those with basidia would be separated from each other on the basis of such a fundamental difference. It is, therefore, surprising to note that when the taxonomic importance of these organs became fully appreciated by later authors the segregation of the two kinds of cup-fungi had already taken place. *Peziza* had been restricted by the exclusion of the genera *Solenia*, *Cyphella*, and *Porotheleum*, and of some species that had been transferred to *Thelephora* and later to *Corticium* (the heterogeneous

TABLE I
LIST OF GENERIC NAMES OF CYPHELLACEAE

Aleurocystis Lloyd ex G. Cunn.—*Cytidia hakgallae* (Berk. & Br.) G. W. Mart.
[1]*Aleurodiscus* Rab. ex J. Schroet.—*Thelephora amorpha* (Pers. per Purt.) Fr.
Arrhenia Fr.—*Cantharellus auriscalpium* Fr.
Auriculariopsis Maire.—*Cyphella ampla* Lév.
Calyptella Quél.—*Cyphella capula* (Holmskj. per Pers.) Fr.
Catilla Pat.—*Cyphella pandani* Pat.
Chromocyphella De Toni & Levi ≡ *Cymbella* Pat.
†*Cymbella* Pat. apud Doass. & Pat.—*Cymbella crouani* Pat. & Doass. apud Pat.
**Cypharium* Clem. ≡ *Cyphella* Fr.
[1]*Cyphella* Fr.—*Cyphella digitalis* (A. & S. per Pers.) Fr.
Cyphellopsis Donk.—*Solenia anomala* (Pers. per Fr.) Fuck.
Cytidia Quél.—*Cytidia rutilans* (Pers.) ex Quél.
Cytidiella Pouz.—*Cytidiella melzeri* Pouz.
Dendrocyphella Petch.—*Dendrocyphella setosa* Petch.
Flagelloscypha Sing.—*Cyphella minutissima* Burt
Gloeosoma Bres.—*Aleurodiscus vitellinus* (Lév.) Pat.
[2]*Henningsomyces* O.K. ≡ *Solenia* Pers.
Lachnella Fr.—*Peziza alboviolascens* (A. & S. per Pers.) Schw.
**Lachnium* Clem. ≡ *Lachnella* Fr.
[3]*Leptotus* P. Karst.—*Cantharellus retirugus* (Bull.) per Fr.
†*Lomatia* (Fr.) P. Karst.—*Corticium salicinum* (Fr.) Fr.
§*Lomatina* P. Karst. ≡ *Lomatia* (Fr.) P. Karst.
Merismodes Earle.—*Cantharellus fasciculatus* Schw.
§*Nodularia* Peck.—*Nodularia balsamicola* Peck.
†*Phaeocarpus* Pat. ≡ *Cymbella* Pat.
[4]*Phaeocyphella* Pat. ≡ *Cymbella* Pat.
†*Phaeocyphella* Speg.—*Phaeocyphella sphaerospora* Speg.
Phaeosolenia Speg.—*Phaeosolenia platensis* Speg.
†*Porotheleum* (Fr. per Fr.) Fr.—*Polyporus fimbriatus* (Pers.) per Fr.
Pseudodasyscypha Velen.—*Cyphella hyperici* Velen.
Rimbachia Pat.—*Rimbachia paradoxa* Pat.
†*Solenia* Pers. per Fr.—*Solenia candida* Pers.
Stigmatolemma Kalchbr.—*Stigmatolemma incanus* Kalchbr.
Stromatoscypha Donk ≡ *Porotheleum* (Fr. per Fr.) Fr.

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* Names not validly published.
† Names not available for various reasons (illegitimate).
§ Names based on species identifiable with type species of legitimate generic names published earlier.
[1] *Aleurodiscus* is conserved against *Cyphella*.
[2] Valid publication of name still uncertain.
[3] Often fused with *Leptoglossum* P. Karst., which is then the correct name.
[4] A later synisonym of *Chromocyphella* De Toni & Levi.

group currently called *Cytidia*). Of course there were, and still are, a few retouches to be made.

Persoon (*1794*: 106) started this process of differentiation by setting aside *Solenia*, with one species, *S. candida* Pers. The leading character was the shape of the fruit-body: "Utriculo sessili membranaceo, cylindrico, ad basin cavo." Shortly afterwards with reference to *Peziza anomala* Pers. he remarked:—

"Incertum est . . . jure sub hoc militet genere [*Peziza*], etiam *hactenus* sub microscopico nullas thecas invenire mihi licuit; eam lubentius *Soleniis* adscripserim, si substantia membranacea & rigida esset: neque etiam ob discum hemisphaericum in apice aliis *Pezizis* similem usque ad basin excavata est."—Persoon (*1796*: 29). For translation, see page 32.

The next year he asked tentatively (Persoon, *1797*: 73) if it would not also be correct to refer to *Solenia* such species as *Peziza urceolata* Vahl and *P. cuticularis* Dicks., both of which he knew only from their published accounts, and both now confidently suspected to be 'Cyphellaceae'. Still later Persoon (*1822*: 281) remarked about *Peziza capula* Holmskj. (which he seems not to have known from specimens under that name), "Ni fallor, potius ad familiam Thelephoream spectat et forsitan species [*Thelephorae*] subgeneris *Epibryi*."

Fries (*1822*: 200) accepted *Solenia* and included not only such species as *Solenia ochracea* Hoffm. (added to the genus as early as 1795), *Peziza candida* and *P. fasciculata* Pers. (two other species entered previously), but also *P. anomala*. Of the genus he stated: "Asci nulli. Sporidia elastice secedunt? vix discernibilia."

Simultaneously with the acceptance of *Solenia*, Fries (*1822*: 201) introduced *Cyphella* Fr. for non-tubular species, "Asci nulli. Sporidia globosa, majuscula, pulveris instar secedentia." (The spore-features were evidently taken from *Peziza digitalis* A. & S.[2]) Thus it is clear that Fries, like Persoon for *Peziza anomala*, accepted the fact that the two genera had no asci, but he did not mention basidia.[3] (Compare also Fries, *1822*: 39, 206).

Fries (*1821*: lv) at first associated *Cyphella* and *Solenia* with *Peziza*, stating however that they differed in the lack of asci, a discrepancy he waved aside with this remark: "Non tamen separo. Eodem modo inter plantas Vasculares, quarum singula series e *plantis aquaticis* a scendit, infimae vasis subdestitutae."

Basidia were detected and (rather crudely) depicted by Léveillé (*1837*: *pl. 8 f. 10*) when he studied *Cyphella taxi* Lév. along with several other hymenomycetes. From that time on *Cyphella* had basidia as far as Léveillé was concerned and when he described *Cyphella gibbosa* Lév. [= *Calyptella capula* (Holmsk. per Pers.) Quél.] and *Cyphella ampla* Lév. [= *Auriculariopsis ampla* (Lév.) Maire] he placed them in

[2] What may be considered the type specimen (ultimate type) of the generic name *Cyphella* is still conserved in Fries's herbarium at Upsala. It is labelled "*Peziza digitalis* Alb. & Schw." (written by G. Kunze), "*Cyphella Digitalis* Fr. (Dedit. Kunze)" (written by Fries).

[3] One of the original species of *Cyphella* is *Peziza eruciformis* Batsch, which Fries knew only from the original account by Micheli. If correctly interpreted today, this would be the first species of the 'Cyphellaceae' ever to be described.

Cyphella because they belonged to the "Champignons basidiosporés" as opposed to the "thecasporés"; for both species he recorded the "basides tétraspores" from the inside of the cup. It is interesting to note that Montagne (*1836*: 286–287) at about the same time that Léveillé clearly saw basidia, could not free himself from tradition and recorded the basidia of his interpretation of *Peziza campanula* C. Nees per Fr. (= *Calyptella capula*) as follows: "Les thèques sont très courtes, en massue, pellucides et contiennent des sporidies globuleuses qu'on n'aperçoit que difficilement et à un très fort grossissement du microscope composé." Montagne, without observing the true spores, clearly described basidia here, basidia with vacuolated contents, but he had not yet learned to recognize them as such.[4] Soon afterwards Fries (*1849*: 336), presumably inspired by Léveillé's work, introduced in the diagnosis of *Cyphella* the words, "sporoph. 4-sporis". *Solenia* he still retained at that time in the discomycetes but with the emphasis on "Discus non discretus."

Peziza alboviolascens (A. & S. per Pers.) Schw. (type species of *Lachnella* Fr.), a species that was to become a prominent member of *Cyphella*, has unusually large basidia and one would expect it to be among the first species for which basidia were recorded. This actually happened but because of the preconceived idea that it had asci, it was not recognized. For instance, when Bonorden (*1851*: 143 *f. 215*) came across it he called it *Myrothecium vitis* Bon., although clearly describing and depicting the basidia. Berkeley (*1860*: 368) acted in a similar manner: "Mr. Jerdon finds a plant very closely resembling [*Peziza alboviolascens*] on *Ulex*, with the fruit of a *Cyphella*. It is probably a sporiferous condition." The next year Berkeley & Broome (*1861*: 379) redescribed it as a new species, *Cyphella curreyi* Berk. & Br., with the remark: "This resembles very closely *Peziza albo-violascens*, but has the fruit of a *Cyphella* [that is, has basidia]. Mr. Currey was, we believe, the first to observe it; and the structure has been repeatedly brought under our notice by Mr. Jerdon."

Shortly afterwards several authors in rapid succession concluded that *P. alboviolascens* itself was basidiferous: the Tulasne brothers (*1861*: 134–135/136; *1865*: 173/159[5, 6]), the Crouan brothers (*1867*: 61), and Karsten (*1867*: No. 715; *1869*: 191). The detection of basidia in other species up till then referred to *Peziza* or *Solenia* occurred simultaneously or shortly afterwards. Since Fries had introduced the basidia as a positive feature in the generic character of *Cyphella* (and had denied their presence in *Solenia*) these species were at first all referred to *Cyphella*, but when it became more and more obvious that the species of *Solenia* as defined by Fries also had basidia, most authors soon also admitted *Solenia* as basidiferous and retained both genera.

The recognition of *Solenia* (Fries's emendation) as a basidiferous genus proceeded

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[4] For a similar case, in connection with *Aleurodiscus amorphus*, see p. 34.

[5] The Tulasnes considered this species the same as *Cyphella taxi* Lév. This is not the case. See also page 103.

[6] The double page numbers refer respectively to the original Latin work and to Grove's translation.

on the whole more slowly than in the case of *Cyphella*. We have seen that for some time the presumed absence of asci in *Solenia* was believed to be a distinguishing feature between the two genera. A retarding factor in the understanding of the nature of *Solenia* was undoubtedly contributed by Corda (*1839*: 39 *pl. 6 f. 96*) who depicted asci with spores in a fungus of the group of *Solenia anomala* (called *Peziza hoffmanni* Spreng. by him), although his drawings are, for that time, in other respects a remarkably accurate and detailed representation of the general structure of the fruit-body. He concluded, "Die Gattung *Solenia* selbst ist nur aus abnormen, ja monströsen Individuen einzelner Arten der Schüsselpilze (Pezizae) entstanden, und kann als nur immaginäre, in systematischen Schriften existirende Gattung nicht weiter anerkannt werden." A few years later Corda (*1842a*: 37; *1842b*: 154), while still considering his *Peziza hoffmanni* as representative of *Cyphella*, stated somewhat less positively: "Wir . . . gestehen offen ein, keinen wesentlichen Unterschied zwischen dieser Gattung und *Peziza* bisher erkannt zu haben." Perhaps the first authors to record basidia in *Solenia anomala* were the Tulasnes (*1861*: 135/136). They remarked in a general way that outward similarity may be coupled with different modes of spore production. As a striking example they mentioned the case of *Peziza* [= *Solenia*] *anomala*, which differed from the true species of *Peziza* in the structure of the hymenium.

The following collection of excerpts from the work of the Tulasnes (*1861*, *1865*) shows that they fully appreciated that both *Solenia* and *Cyphella* had basidia and in this respect differed from the true pezizas.[7]

"*Peziza albo-violascens* Alb. & Schw.[8] is retained by Berkeley among the true, i.a. ascophorous Pezizas (Outl. of Brit. Fung. p. 368, no. 58), although he mentions that Jerdon had met with this fungus in the state of a real *Cyphella*; from this he seems to suspect that *Cyphella* is a sporophorous (basidiophorous) state of *Peziza*. But we fear that no one has ever found [*Peziza alboviolascens*] truly ascophorous, and, therefore, it is wrong to place it among the Pezizas. We hold the same opinion about *Peziza anomala* Pers., which also finds a place in Berkeley's work (p. 369, no. 81) among *Pezizae* (*Tapesiae*) . . .."—Tulasne (*1861*: 134–135/136).

". . . they are also deceived who, not noticing Persoon's warning, . . . have not recognized that his *Peziza anomala* (*Cyphella Hoffmanni* Tul.) is widely distinct from the true Pezizas in the structure of the hymenium. . . . 'It is uncertain', says Persoon (Obs. Myc. part I, 1796, p. 29, no. 61), 'whether this species (*Peziza anomala* Pers.) finds its true place in this genus (*Peziza*), since it does not agree with the rest in its mode of growth, its changeable form, etc.; moreover up to the present I have not succeeded in finding thecae under the microscope; if the substance had been membranous and rigid, I would rather have placed it among the *Soleniae* . . .' In the previous year G. F. Hoffmann had already met with the same fungus, and had given it the name *Solenia ochracea* in the seond part of his Deutschlands Flora for the year 1795, pl. 8, f. 2.[9]. . . Corda recognized hardly any distinction between *Soleniae* or *Cyphellae* and *Pezizae*, until he had been taught the true structure of the hymenium in *Cyphellae* by Léveillé. (Cf. his Anleit. z. Stud. d. Mycol. p. 153, 154, 193.) That is the reason why *Peziza anomala* Pers. or *Peziza Hoffmanni* Spreng. (*Solenia ochracea* Hoffm.)[9] is figured by Corda

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[7] I follow Grove's translation.

[8] The Tulasnes applied this name to a mixture of three species (cf. p. 103).

[9] It is now generally accepted that *Solenia ochracea* Hoffm. is not synonymous with *Solenia anomala* as the Tulasnes thought it was.

among the true Pezizas (Icon. Fung. Vol. iii, 1839, p. 39, pl. 6, f. 96). But though that skilled mycologist asserts that the hymenium is composed of claviform, pellucid, and six-spored asci, while the spores are seen to be ovate and pallid, the figures which he gave scarcely convince us of this, for they show a thelephorous hymenium, i.e. one much thinner than would be suitable for a *Peziza*, and thecae so vague and uncertain that we cannot help thinking that the draughtsman had incautiously made a mistake about their true nature. . . ."—Tulasne (*1861*: 135–136/137).

"We have already mentioned (supra, volume i, p. 136/[137] . . .) that *Peziza alboviolascens* Alb. & Schw. . . . once the type of Fries's *Lachnellae* (Fl. Scan. p. 343), which Persoon called *fallax* (Myc. Europ. vol. i, p. 266, no. 118), belongs to the master of Upsala's *Cyphellae*; we are therefore not surprised that de Notaris wasted his time by looking in it for true thecae. . . . At this opportunity we may be permitted here again to assert that *Peziza anomala* Pers. is nothing but a true *Cyphella* . . .; for . . . we succeeded in finding that fungus . . . with a hymenium manifestly provided with real basidia and abundance of spores in groups of four; the spores were such as are found in very many thelephoroid fungi, shortly oblong-cylindrical, obtuse and somewhat inaequilateral, each at first supported on a short and often hardly visible sterigma."—Tulasne (*1865*: 173/159).

Although the Tulasnes clearly differentiated *Peziza* (with asci) from *Cyphella* (with basidia) it may be remembered that they did not yet believe that asci and basidia are typical of widely different taxonomical groups of fungi. The basidia were for them not organs of precisely the same value as asci but rather comparable to such conidiophores as occur in imperfect states of pyrenomycetes. In this respect de Bary was ahead of them. Thus, the Tulasnes (*1861*: 135/136) remarked: ". . . [We] should be by no means surprised if one and the same pezizoid species should become at one time ascophorous (*Peziza*), at another basidiophorous (*Cyphella*), while keeping the same form, as happens among the *Sphaeriacei* . . .."

The occurence of basidia in *Solenia* emend. Fr. was more generally acknowledged as late as around 1870 in different quarters at about the same time. Samples are: –

"[*Solenia*] has been placed amongst the Discomycetes from neglect of its mode of fruiting; the spores are produced as in *Cyphella*."—Broome, quoted by Cooke (*1871*: 329).

"Ich habe mich jetzt überzeugt, dass weder bei [*Solenia anomala*], noch bei den anderen hierher gezogenen, Schläuche vorhanden sind."—Fuckel (*1871*: 291). Basidia were described simultaneously for *Solenia spadicea* Fuck.

Fries never made it very clear what the real differences between *Solenia* and *Cyphella* were. In his final work (*1874*) he differentiated them thus.

Solenia: ". . . Tubuli membranacei, subcylindrici, turbinati, . . . terram definite spectantes, *ore connivente*, quo a *Cyphellis* differunt."—Page 595.

Cyphella: "Fungi submembranacei, cupulares, raro plani, postice adnati, vulgo stipitato-porrecti, penduli. Hymenium definite inferum . . . *Soleniis* sine dubio proximum et ob characteres artificiales ab his remotum . . .."—Page 661–662.

Evidently he was not quite satisfied himself about the two being really different and one wonders how later mycologists could have been content with maintaining both. Patouillard (*1900*: 54) fused the two into a single genus which he subdivided into three sections. He considered this combination a very homogeneous group.

However, *Solenia* and *Cyphella* survived as distinct genera up till the present time and have remained artificial taxa not satisfactorily separated from each other. In my opinion this situation is best taken care of by recognizing a single artificial genus *Cyphella* embracing all 'Cyphellaceae' and from which the better known elements are to be removed as soon as a more natural position has been worked out for them.

Aleurodiscus.—*Peziza amorpha* Pers., the type species of *Aleurodiscus*, has disk-, or rather, lens-shaped fruit-bodies, centrally attached, with even hymenium, and upturned margin. It was originally logically described under *Peziza* and later sometimes either included in *Cyphella* itself or considered to belong to the 'Cyphellaceae'. A discussion on it and similar species may for this reason be included in the present notes.

It was the author of the species himself who began to doubt the inclusion of it among the pezizas (Persoon, *1822*: 269): "Haecce species quoad structuram melius examinata, ut genus proprium ad familias *Thelephorarum* referri forsitan deberet et cui adnumeranda esset *Thelephora evolvens* . . .." Fries (*1828*: 183) did not think a new genus was necessary: he included it (with *Thelephora evolvens* Fr. per Fr.) in a special group of *Thelephora* Ehrh. ex Fr. that also contained *Thelephora salicina* Fr. This group is more fully discussed on pages 71–72 in connection with *Cytidia*.

It is not surprising that a new genus was thought necessary for this remarkable species. Rabenhorst (*1874*: No. 1824) introduced the generic name *Aleurodiscus* Rab. for it, but did not validly publish the name. He did neither supply a generic description nor a proper reference to a description, although he added drawings of the hymenial elements. This was not sufficient since the only original species was not a new one. The promise, "Das Nähere wird binnen Kurzem in der Hedwigia besprochen werden", he did not fulfil.

Rabenhorst's drawings of the hymenial elements show the spores, the sterile elements ('pseudophyses' of later authors), and the basidia which evidently were not recognized as such: the latter were all drawn without any indication of sterigmata and some of them show internal bodies that look remarkably like the separately drawn spores. Several years earlier de Bary (*1866*: *f. 45*) had published exemplary drawings of the basidia and their development, and of the spores; he even noted the fusion nucleus of the basidia. Without detracting anything from de Bary's merits, it should be pointed out that the basidia of this species are very favourable objects because of their large dimensions.

How difficult it was at that time to recognize basidia if one did not quite expect them is shown by a note by Berkeley (*1860*: 369); he emphatically denied their presence: "*Peziza amorpha* P., is referred by Fries to *Corticium*, but it has perfect asci. As I have not seen fresh specimens, I cannot determine to what genus it belongs." When Peck (*1872*: 96 *pl. 4 f. 23–26*) came across the fungus he did not recognize it and established a new genus for it, calling the species *Nodularia balsamicola* Peck. He, too, did not recognize the basidia, and called them asci. The generic

name *Nodularia* Peck is pre-empted, and Cooke (*1875*: 136–137) pointed out that *Aleurodiscus* and *Nodularia* were identical. Saccardo (*1881*: 304–305), many years later, had his doubts about the presence of asci: "Verae endosporae maturae a nemine observatae; quare sic dicta nil nisi basidia videntur." De Bary's textbook (*1886*) seems to have been much neglected by comtemporary mycologists, and the basidia had to be rediscovered independently by Richon (*1877*: 149 *fs. 4, 5*)—and again forgotten for quite a number of years!

Berkeley & Broome (*1876*: 137–138 *pl. 9 f. 1*) arrived at a complicated conclusion, although they are somewhat vague on precisely how the spores are formed. The figure shows them as bursting through the apex of the 'clavate bodies'.

> "The hymenium consists of colourless threads, and orange-coloured clavate bodies filled with pigment. These at length project beyond the surface, and produce four globose rough spores, .001 inch in diameter, which contain an angular body within which looks like a cystolith. After a time each spore becomes elliptic, and now measures .0012 inch in length, produces about eight elliptic echinulate sporidia in its cavity, which are from .0004–.0005 inch long—a circumstance without parallel, as far as we know, in Hymenomycetes. All these points have been observed by each of us independently . . .."

The next important step was made by Schroeter (*1888*: 429) who furnished the generic description necessary to validate the generic name *Aleurodiscus*. But he did more: he emphasized the exceptionally large basidia and spores and added to the cyphelloid type species—a totally resupinate fungus, *Corticium aurantiacum* (Pers. per Fr.) Sacc. This would prove to be a remarkable example of Schroeter's acuteness, since no modern author has as yet ventured to remove it from the genus.

Towards a family of Cyphellaceae.—Although Fries (*1874*) acknowledged the affinities between *Porotheleum*, *Solenia*, and *Cyphella*, he placed the first two genera in the "Polyporei" and the third in the "Thelephorei", which also included *Corticium amorphum* (Pers. per Purt.) Fr. and *Corticium salicinum* (Fr.) Fr. as species of *Corticium* Fr.

The first step towards a family of Cyphellaceae consisted of the re-uniting of *Cyphella* and *Solenia* within a single group. This was done, for instance, by Quélet. That author at first admitted a family "Auricularii" (*1886*: 201) which agreed with Fries's Thelephorei except for the inclusion of *Auricularia* Bull. This genus had as species, to mention only the prominent ones, *Auricularia mesenterica* (Dicks. per S. F. Gray) Fr., *Hirneola auricula-judae* (Bull. per St.-Am.) Berk., *Cyphella ampla* Lév. (as *Auricularia leveillei* Quél.), and *Corticium salicinum*. Soon afterwards, Quélet (*1888*: 24) distinguished within the "Auricularii" a tribus "Cyathini" consisting of (i) *Auricularia* Bull., with *A. tremelloides* (Bull. per St.-Am.) Mérat (= *A. mesenterica*), *Hirneola auricula-judae*, *Cyphella ampla*, and *Corticium evolvens* (Fr. per Fr.) Fr.; (ii) *Cytidia* Quél., a new genus for *Cytidia rutilans* (Pers.) ex Quél. (= *Corticium salicinum*); (iii) *Calyptella* Quél., a segregate from *Cyphella*; (iv) *Cyphella*, to which *Corticium amorphum* had been transferred; and (v) *Solenia*.

At about the same time J. Schroeter (*1888*: 433) established within the family "Thelephorei" a "Gruppe Cyphellei" including both *Solenia* and *Cyphella*—as well as *Craterellus*.

It was left to Patouillard (*1900*: 52) to write the most noteworthy synopsis of the 'Cyphellaceae'. This survey, concise as it is, is well informed and clearly demonstrates that he had the best first-hand knowledge on a world-wide scale of these fungi. His "Cyphellés" (as a part of his "Porohydnés") comprise the genera *Aleurodiscus*, *Cytidia*, *Cyphella* (fused with *Solenia*, and also including *Calyptella*), *Porotheleum*, *Punctularia* Pat., and *Phaeocyphella*. Here, the three genera *Cyphella*, *Solenia*, and *Porotheleum* appear all united in the same taxon. The genus *Punctularia* is in many respects so different from the rest that it may as well be excluded from further discussion: the resupinate fruit-body bears blunt warts or ridges instead of cups and the hymenium is localized on these warts only, thus somewhat suggesting many individual 'fruit-bodies' on a common 'stroma' as in *Porotheleum*.

Maire (*1902*: 99) introduced the family name "Cyphellacées", which he applied in a very broad circumscription, viz. for all Aphylloporales with chiastic basidia and with smooth, tuberculose, or folded hymenium. One of the tribus is the "Cyphellées" which practically correspond to the "Cyphellaceae" of most modern authors, for instance of Pilát (*1925b*).

The number of genera has not been much increased since Patouillard's account of 1900. A few small new genera have been generally accepted. Other additions removed from other families have not been admitted by all authors. In this connection may be mentioned as examples: *Chlorocyphella* Speg., hailed as lichenized cyphellas, still admitted by Pilát (*1925b*: 45), but in reality imperfect fungi either lichenized or parasitic on lichens; and *Fistulina* Bull. per Fr. included by Lohwag & Follner (*1936*), a disposition that was foreshadowed by remarks by Fries.

This inclusion of *Fistulina* is in my opinion far-fetched. The differences from *Porotheleum* (which acted as the magnet) are so enormous that little more than a formula like, 'possessing densely crowded but discrete cups or tubes on a common body' holds the two together, but little else. Bondartsev & Singer (*1941*: 44, 45) accepted the inclusion of *Fistulina*; they admitted a suborder Cyphellineae, which they divided into two families, the Cyphellaceae, and the Fistulinaceae in which they placed both *Porotheleum* and *Fistulina*.

Some years later Singer (*1945*) divided the Cyphellineae (without any mention of the Fistulinaceae) into (i) the Cyphellaceae, to which were added *Rimbachia* and *Arrhenia*, and (ii) the Leptotaceae[10] which comprised *Leptotus* (but not *Leptoglossum* P. Karst.), *Campanella* P. Henn., and *Favolaschia* (Pat.) Pat. apud Pat. & Lagerh. It is difficult to understand some of the additions, especially of *Campanella*. From a later publication it appears that Singer (*1951*: 735) is no longer certain of the position of the components of the Leptotaceae.

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[10] Leptotaceae R. Maire, nomen nudum, formerly tribus Dictyolées Maire; correct name, Dictyolaceae Gäum.

The genus *Leptotus* is a good example of the difficulties that arise if one is determined to uphold a family Cyphellaceae. One may differ in opinion on whether or not *Leptotus* P. Karst. [type, *Cantharellus retirugus* (Bull.) per Fr.] and *Leptoglossum* P. Karst. [type, *Cantharellus muscigenus* (Bull.) per Fr.; synonym, *Dictyolus* Quél.] should form a single genus, but with our present knowledge one can hardly doubt that they are closely related. Some modern authors combine the two and Singer (*1951*: 735) even includes a centrally stalked species, *Omphalia muralis* (Sow. per Fr.) Quél. sensu Ricken under the name of *Leptotus rickenii* Sing. If one believes the 'Cyphellaceae' to represent a good family one will be inclined to keep *Leptotus* (fruit-body dorsally attached) distinct from *Leptoglossum* (with lateral stalk), place the former genus in the Cyphellaceae, and not admit the latter. This is, in my opinion, an altogether artificial solution, that would at once raise the question why the cupulate agarics in general are not transferred to the 'Cyphellaceae', for the latter 'family' already contains a number of species that often develop pronounced folds which may be difficult to distinguish from obtuse gills (*Cantharellus retirugus*, *Cyphella ochroleuca* Berk. & Br). An agaric genus like *Resupinatus* (C. Nees) per. S. F. Gray has its counterpart among the 'Cyphellaceae' in *Stigmatolemma*.

Aleurodiscus has also been a problem from the start. It was a name originally given to *Corticium amorphum* only, but J. Schroeter (*1888*: 429) added to this species with a disk-shaped, centrally attached fruit-body another species which is completely resupinate and has not yet been removed from the genus. It is, therefore, understandable that *Aleurodiscus* has been placed by some (Patouillard) in the 'Cyphellaceae' and by others in the 'Thelephoraceae' (or, better, Corticiaceae). Pilát (*1926*: 206) made it a special group (Aleurodiscinae) of the Corticiaceae. He was followed by Killermann (*1928*: 142) who also included *Cytidia* in the tribus Aleurodisceae.

The preceding outline of the history of the 'Cyphellaceae' shows that the family has been widely accepted for a considerable period up till the present time. Recently W. B. Cooke (*1957*) adopted the group presumably in about the same sense as it has been delimitated by Pilát. Yet a careful study of many prominent species has convinced me that the 'Cyphellaceae' are a very heterogeneous assemblage that has not the slightest right to exist. The diverse elements have been held together by superficial likeness but evidently are of various relationships. I believe that Romagnesi (*1950*) is basically correct when he considers a number of species closely related to, and inseparable from, different groups of agarics, like the Marasmiaceae, Pleurotaceae, and Naucoriaceae (as he understands these taxa). I had reached similar conclusions in regard to a great part of the 'Cyphellaceae' when I met Dr. R. Singer in 1946 (cf. Singer, *1951*: 312, *Flagelloscypha* Donk, 343, *Lachnella* Fr., 345, *Merismodes* Earle). I would now mention the Schizophyllaceae as another group (independent of the agarics in my opinion), to which a number of 'Cyphellaceae' show relationship, and there is more in this vein, that I hope to discuss in the present series.

Relationship and phylogeny.—If one includes in a single taxon the horse, the sea elephant, and the mouse and declares them all closely related, one will get a group with relationships in various directions. This is about what has happened with the 'Cyphellaceae'.

The moss-inhabiting species that were later to be transferred to *Cyphella* were classed by Persoon as species of *Thelephora* Ehrh. ex Fr. On the occasion of the publication of *Thelephora muscigena* Pers. he remarked, "In hymenio subrugulosa est, hinc *Merulius* affinis" (*1801*: 572). When he introduced *Thelephora* subgen. *Epibryus* Pers. (*1822*: 115) for this and another species, he again stated that the taxon was close to the muscigenous species of *Merulius* (Persoon's sense). It may be surmised that he thought of such species as *Merulius muscigenus* (Bull.) Pers., *M. retirugus* (Bull.) Pers., *M. lobatus* Pers. which he entered in *Merulius* subgen. *Cantharellus* (Juss.) Pers. and which Fries (*1821*) placed in *Cantharellus* Adans. per Fr. together with *Thelephora muscigena*. Afterwards the moss-inhabiting species with an even hymenium were artifically separated from *Cantharellus* and transferred to *Cyphella*. Having done this Fries (*1822*: 201) declared, "*Cyphella* . . . Genus . . . ad Pileatos, speciatim *Cantharellos*, accedit." Of course others agreed:

"On pourrait, à la rigueur, laisser le *Cyphella* à côté du *Thelephora*, parce que son hymenium est lisse; mais je pense qu'il conviendrait mieux de le rapprocher du genre *Cantharellus*, dont plusieurs petites espèces comme le *C. muscigenus*, *bryophilus*, *retirugus*, etc., présentent la consistance, la structure et la disposition des spores, et qui n'en différent que par les lames ou les plis de l'hymenium."—Léveillé (*1841*: 239).

When it became evident that *Cantharellus* was a very mixed group, the remaining moss-inhabiting species of this genus were placed in *Dictyolus* Quél. (in part) = *Leptoglossum* P. Karst. + *Leptotus* P. Karst., and the name *Cantharellus* became substituted by these in discussions on relationship.

It is interesting to note that Persoon (*1822*) was inclined to associate *Solenia* with such genera as *Boletus* (broad sense, inclusive of *Polyporus sensu lato*). Thus he remarked under *Solenia fasciculata* Pers. (p. 335): "Haec et antecedens [which means, the genus *Solenia* as a whole], in serie fungorum (praesertim generum majorum) a completis ad simplices aut vice versa, *Boleti* (*Poriae*) esse videntur, qui se tantum ut *tubulos* exhibent."

When Fries decided to remove *Solenia* and *Cyphella* from the discomycetes and to arrange them among the hymenomycetes, *Solenia* was classed in the "Polyporei" along with *Porotheleum* (Fries, *1874*). This genus he associated from the start with *Polyporus* and also compared it with *Solenia* at a very early date (Fries, *1821*: 506) when he added to *Polyporus* subgen. *Porotheleum* (Fr.) per Fr. the definition "Asci nulli. (*Solenia*)." The theoretical implication behind this arrangement is that *Solenia* had 'free' pores (tubes) and that a whole colony is comparable to a single fruit-body of a resupinate species of *Polyporus* (*Poria*). Incidentally, Persoon (*1796*: 29) had already remarked about *Peziza anomala*: "Hab. . . . ad ramos dejectos, ubi

multa individua ita conferte sibique approximata crescunt, ut quasi unum repraesentent fungum." He also suggested the relationship of *Solenia* with *Poria* (see above). Fries's ideas were summarized thus:—

"*Solenia*. . . . Receptaculum nullum. Tubuli . . . *ore connivente*, quo a *Cyphellis* [Thelephorei] differunt. *Cyphellis* maxime affine genus, sed ab illarum typicis speciebus magis recedit, quam ut conjungatus. Ex altera parte *Porotheliis*, neglecto horum receptaculo, prope accedit. Suadente genere *Mucroniarum*, quod nudos tantum aculeos, proponitus tamquam infimus gradus Polyporeorum, ad quos quaedam species accedunt. Evolutio tubulorum cum *Fistulinae* analoga. Cum *Pezizis* ob defectum disci ascigeri non potest comparari."—Fries (*1874*: 596–597)

This is Fries's matured view of the relationship of the three oldest genera of 'Cyphellaceae' in a nutshell. It dominated the situation for a long time and has not yet been totally abandoned. A remarkable later development is (or, perhaps, was) the renewed inclusion in *Poria* of *Porotheleum fimbriatum* (the type of *Porotheleum*) by American authors like Lloyd, Overholts, and Lowe. This is (was) definitely a long step back because the differences between the two genera are great.

Various authors have accepted the early suggestion of a close relationship between *Porotheleum* and *Fistulina*. For instance, J. Schroeter (*1888*: 494) associated the two in a special group of the Polyporaceae, while Lohwag & Follner (*1936*) transferred *Fistulina* to the 'Cyphellaceae' of which they considered *Porotheleum* a member. We have also seen that Bondartsev & Singer (*1941*: 44, 45) provided for a family of Fistulinaceae (*Fistulina* and *Porotheleum*) of the suborder Cyphellineae.

If artificial genera like *Cyphella*, *Solenia*, and *Porotheleum* are combined in a single group, and such as *Aleurodiscus* and *Cytidia* added as well, and if in addition one keeps to the supposed relationships, the 'Cyphellaceae' will show relations to the Corticiaceae (*Aleurodiscus* and *Cytidia*), the Polyporaceae and/or the Fistulinaceae (*Porotheleum*), and the Agaricaceae and/or the Cantharellaceae (moss-inhabiting cyphellas). For a full review of the phylogenetic speculations in this connection, augmented with personal conclusions, see Pilát (*1925b*: 41–52).

Here, the following recapitulation may suffice. The origin of the 'family' has been sought in (i) the Corticiaceae, especially in *Corticium* Fr. by the earlier authors on the subject, by Pilát (who also mentions *Merulius* Fr.), and by Gäumann (*1926*: 505); and (ii) in *Dictyolus* (= *Leptoglossum* plus *Leptotus*) by Maire (*1902*: scheme opposite p. 195) and by Vuillemin (*1912*: 362, scheme).

The following taxa have been considered derived from the 'Cyphellaceae' (i) the Polyporaceae (Maire, Vuillemin, Pilát); (ii) the Fistulinaceae (Gäumann); and (iii) *Leptoglossum*, including *Leptotus* (Pilát); and (iv) the Corticiaceae (Maire).

Chlorocyphella Speg. (which is non-basidiomycetous) also readily found a place in some schemes of derivations as a lichenized member of the 'Cyphellaceae' without an actual study of its species.

3.—Excluded genera and species

Excluded genera

The following genera were, or have been, at some time or other admitted to the 'Cyphellaceae' or 'Cyphellineae', but do not fall under the character given above for that family, or are better excluded for other reasons. As for Maire's "Famille des Cyphellacées" (*1902*: 99), only the genera he included in his "Tribu des Cyphellées" have been taken into account. A few odd genera are also discussed to facilitate reference to them.

Campanella P. Henn. — Referred by Singer (*1945*: 179) to the "Cyphellineae" (fam. Leptotaceae). The hymenophore varies from 'merulioid' to lamellate; usually the pattern consists of a few radiating gills with anastomoses of varying height, but this initial condition may become more complicated and finally difficult to observe. The genus should be excluded from the 'Cyphellaceae' as here defined and seems better placed among the agarics. There may be a short lateral stalk present, but in most species the fruit-body is cyphelloid.

The key-character Singer (*1945:* 185) uses to separate *Campanella* from *Leptotus* is the nature of the context, viz. hyphae gelatinous for the first, and hyphae not gelatinous for the second genus. In addition, in the generic description Singer (*1945:* 190) introduces for *Campanella* the presence of "dichophyses on sterile surfaces forming a more or less conspicuous asterostromelloid structure". These 'dichophyses' are hardly comparable to the true dichophyses (= dichohyphidia) of the corticiaceous genus *Vararia* P. Karst. (*Asterostromella* Höhn. & L.). These branched hyphae may be much reduced, but are interesting as they call to mind similar bodies in some agaric genera, *Dictyopanus* Pat., *Mycena* (Pers.) per S. F. Gray *sensu lato*. It may be questioned if these 'dichophyses' are essential to the generic character.

For the moment I would suggest inclusion in *Campanella* of *Arrhenia flabellula* (Berk. & C. ex Cooke) Dennis, which has been reported as synonymous with *Rimbachia cyphelloides* (J. Rick) ex Lloyd.

Chaetocypha Corda. — The genus was introduced for a single species, *Chaetocypha variabilis* Corda, which Fries identified with *Cyphella goldbachii* Weinm. Because O. Kuntze (*1891:* 847) considered *Cyphella* Fr. a later homonym of *Cyphelium* Ach., he substituted *Chaetocypha* for *Cyphella*.

However, there is no sufficient reason to accept Fries's identification of *Chaetocypha variabilis* with *Cyphella goldbachii*. Corda's species has not been recognized by later mycologists and the author himself soon indicated that the name should be buried. Donk (*1951:* 208) does not consider it a basidiomycete. In any case I do not recognize a cyphella in Corda's fungus and, therefore, have to exclude it from consideration. For my interpretation of *Cyphella goldbachii*, see pag. 85.

Chlorocyphella Speg. — When this genus was published the author remarked, "Genus Hymenolichenibus certe pertinens." Keissler (*1927*) gave a good

account of it, but did not at the time deny its basidiferous nature; he could not clearly make out the basidia. Mameli-Calvino (*1930*) concluded that the spores were not formed on true basidia and that the fructification was that of imperfect fungi. Keissler regarded the species as "Flechtenparasiten" rather than as lichens producing cyphella-like fruit-bodies; Santesson (*1952:* 41) speaks of parasymbionts. However, Mameli-Calvino concludes that *Chlorocyphella subtropica* Speg. is a lichen, and sets up a special group of Deuterolichenes for the genus. Keissler also found that *Campylidium* Müll.-Arg. (*1881*) and *Orthidium* Müll.-Arg. (*1890*) are synonyms, but he rejected these earlier names in favour of *Chlorocyphella* (1909) because their author had given them to what he supposed to be (basidiferous!) anamorphoses of lichens—hardly a valid reason for rejecting them with our present knowledge about the true nature of the 'basidia'. Santesson identifies *Chlorocyphella* with *Pyrenotrichum* Mont. (*1843:* 376), a name still earlier than those of J. Müller and *Chlorocyphella*. He lists nine species for the genus; a few of these received names under *Cyphella*, viz. *Pyrenotrichum splitgerberi* Mont. (*Cyphella aeruginascens* P. Karst.; *C. subcyanea* Ell. & Ev.; *C. lichenicola* Keissl.) and *P. foliicola* (Vain.) R. Sant. (*Cyphella foliicola* Vain.).

Corniola S. F. Gray. — See under *Leptoglossum.*

Craterellus Pers. — Schroeter (*1888:* 436) placed this genus in his "Gruppe Cyphellei" along with *Solenia* and *Cyphella*. It is currently classed among the Cantharellaceae. In any case there is no good reason to consider it cyphellaceous.

Dacryobolus Fr. — *Odontia sudans* (A. & S. per Fr.) Bres. = *Dacryobolus sudans* (A. & S. per Fr.) Fr. forms thin, somewhat watery looking, closely adherent fruit-bodies bearing teeth with diaphanous, coloured, resin-like bodies resembling minute drops, a single one of which occupies the axis and tip of each tooth. When the teeth are viewed from above they appear hollowed-out, especially if the bodies have fallen away. These 'cups' are sterile inside (the hymenium lines the outside) and thus are quite different from the cups of *Stromatoscypha*. For details, see Lohwag (*1931:* 89–91 *f. 1*) and compare the fine photographs published by Lloyd (*1917: fs. 1110, 1111*). I agree with Eriksson (*1958:* 115) that *Odontia sudans* might well be taken to represent a genus of its own (*Dacryobolus* Fr.).

This fungus has several times been described as a new species of *Porotheleum* = *Stromatoscypha*, which is why it is here entered among the excluded genera. For examples or possible examples of these species of '*Porotheleum*', see the discussion of excluded species below: *P. confusum* Berk. & Br., *P. hydnoideum* Berk., *P. papillatus* Peck, and *P. stevensoni* Berk. & Br. On the other hand, *P. friesii* Mont. is not one of these.

Dictyolus Quél. — See under *Leptoglossum.*

Discocyphella P. Henn. — Type species, *Discocyphella marasmioides* P. Henn. & Nym. apud P. Henn. The generic name is rather misleading: the species is cen-

trally and ventrally stalked. Hymenophore smooth. Not to be included in the 'Cyphellaceae'. To Singer (*1951:* 373), practically a nomen dubium. Patouillard (*1900:* 147) and von Höhnel (*1911:* 167) referred it to *Cymatella* Pat. which Singer (*1951:* 310) treats as an agaric genus close to *Marasmiellus* Murrill emend. Sing.

Favolaschia (Pat.) Pat. apud Pat. & Lagerh. — Referred by Singer (*1945:* 174) to the "Cyphellineae" (fam. Leptotaceae). Since the hymenophore is tubulose, the genus is left out in the present paper because the (artificial) family character adopted above excludes taxa with 'compounded' hymenophore. Inclusion among the agarics seems the best solution, but if there is an objection to this course, the genus might be placed in the Polyporaceae, which in the current wide circumscription is quite artificial. Compare also Singer (*1951:* 732).

Several of the smaller species look like discomycetes, a resemblance which is in some cases expressed in the specific epithets ('pezizaeformis', 'pezizoideus') and on superficial examination may be confused with cyphellas. Some species which have only a few tubes (pores) to the fruit-body may develop individual fruit-bodies that have only one. Such fruit-bodies are 'cyphellaceous' in the strict sense of this paper; the accompanying compound ones have been described as 'aggregate' by some authors. One or two species that have been included in *Cyphella* are discussed below: *Cyphella subceracea* P. Henn., and compare also *C. australis* Speg. and other species.

Fistulina Bull. per Fr. — The prevailing tendency is to classify this genus in a family of its own among the Aphyllophorales, or in a subfamily of the Polyporaceae. See comments on page 36.

Hypolyssus Pers. sensu Berk. = *Caripia* O.K. (cf. Donk, *1957a:* 23). — Herter (*1910:* 132) placed this genus among the Cyphellaceae, apparently because of a complete misunderstanding of the structure of the fruit-body. The hymenium lines the outside (underside) of a turbinate, solid cap.

Leptoglossum P. Karst. — The type species, *Cantharellus muscigenus* (Bull.) per Fr. has laterally stalked fruit-bodies and, therefore, falls outside the 'Cyphellaceae' as defined above. *Corniola* S. F. Gray (preoccupied) and *Dictyolus* Quél. are typonyms and to be rejected. The genus is often rather broadly conceived (sometimes under the incorrect names *Leptotus* or *Dictyolus*) by the inclusion of species with dorsally attached fruit-bodies like *Cantharellus retirugus* (Bull.) per Fr.; and, also, by the inclusion of cup-shaped species with more or less typical gills, which in most cases should be transferred to the agarics. As to the position of *Leptoglossum*, it would seem that it may also be placed close to some species that are currently considered to be agarics, like *Pleurotus tremulus* (Schaeff. per Fr.) Kummer and *Omphalia muralis* (Sow. per Fr.) Kummer sensu Ricken. Singer (*1951:* 735) even included these species in '*Leptotus*'.

The character given above of the 'Cyphellaceae' necessitates treating of the group without lateral (or central) stalk as cyphellaceous, and some of its components

will be discussed in a future instalment; the stalked species will be left out of account. See also remarks on page 37.

If one decides to keep apart from the species with stalked fruit-body such (muscicolous) species as *Cantharellus retirugus*, these should be excluded under the name *Leptotus*.[11] If one considers the types of *Leptotus* and of *Leptoglossum* congeneric, then the latter name is the correct one (cf. Donk, *1951:* 214). The incorrect use of *Leptotus* for this product of fusion has caused the introduction of several stalked species into *Leptotus*. These are:

Leptotus glaucus (Batsch per Fr.) Maire, *Cantharellus glaucus* (Batsch) per Fr., which (if correctly interpreted) has been made type of *Geotus* Pilát & Svrček (*1953*).

Leptotus muscigenus (Bull. per Fr.) Maire, *Cantharellus muscigenus* (Bull.) per Fr., type of *Leptoglossum* P. Karst.

Leptotus rickenii Sing. (nomen nudum), name change for *Omphalia muralis* (Sow. per Fr.) Quél. sensu Ricken, which is centrally stalked and not evidently muscicolous.

Leptotus tremulus (Schaeff. per Fr.) Sing., *Pleurotus tremulus* (Schaeff. per Fr.) Kummer, with typical gills and truly agaric.

Marasmius Fr. — Among the species of this genus, there are a number (especially of those occurring in the tropics) in which the fruit-body has a reduced stalk which may virtually disappear as the fungus develops or is completely stalkless (fruit-body dorsally attached). If in addition, the gills are reduced, sometimes to the point of a completely smooth hymenium, it is not surprising that confusion with *Cyphella* arises. When one finds in the tropics 'sessile' cyphellas on small twigs or on coriaceous leaves, with asymmetrical fruit-body, they will usually belong to these species of *Marasmius*. The lateral notch represents the place where the stalk is or was to be found. Similar conditions occur in minute species of *Pleurotus* (Fr.) Kummer (*sensu lato*) and *Clitopilus* (Fr.) Kummer, but in these genera the tendency to develop a smooth hymenophore is hardly evident. These species of *Marasmius* are often associated with thread blights. Petch (*1924:* 19-23) recognized *Cyphella pulchra* Berk. & Br. as one of them. Recently *Marasmius cyphella* Dennis & Reid (*1957:* 288 *f. 2*) was described from among these fungi. I suspect that *Cyphella juruensis* P. Henn. and *C. reniformis* Pat. are additional examples.

Peniophorina Höhn. — The genus was introduced for a single species that was identified with *Chaetostroma pedicellatum* Preuss. The author considered it basidiomycetous, and if this were true it would be sought for among the 'Cyphellaceae' rather than among the Corticiaceae (lens-shaped fruit-body, but no stalk). However, Donk (*1951:* 216) concludes that it is non-basidiomycetous.

Pistillina Quél. — It has been suggested that this genus may be related to *Cyphella* (Coker, *1923*: 6). Since the 'disk' is convex and the fruit-body plainly

[11] Some would perhaps consider *Leptotus* P. Karst. preoccupied by two (orthographically slightly different) homonyms, *Leptotes* Lindl. (1833) and *Leptotis* Hoffmansegg (1824). In that case a new name should be coined.

stalked, it is best placed for the time being among the 'Clavariaceae', in its current delimitation an artificial family. See Corner (*1950:* 107, 497). It is suggested below (p. 47) that *Cyphella agariciformis* Pilát belongs to *Pistillina*.

Pleurotopsis (P. Henn.) Earle. — See under *Plicatura* Peck.

Plicatura Peck. — Donk (*1951:* 217) listed *Plicatura* and *Pleurotopsis* (P. Henn.) Earle as cyphellaceous. The reasons for so doing were, first, that he considered the two congeneric, and, secondly, that young fruit-bodies are more or less typically cyphellaceous and that there are a number of cyphellas which seem to be closely related to species of *Plicatura*. Mature fruit-bodies are usually too big to make a cyphellaceous impression and, in addition, have a strongly folded hymenophore. However, the edges of the folds remain fertile. For the present the genus will be left out of account, but I hope to return to it in a further paper of the present series.

Punctularia Pat. — Patouillard (*1900:* 57) stressed: "Hyménium limité à la surface des tubercules" and thought it came near to *Porotheleum*, "dont il est en quelque sorte une forme à hyménium convexe ou plan." In other words, if one conceives the cups lined on the inside with the hymenium of *Stromatoscypha* replaced by warts to which the hymenium is limited, this would result in a genus like *Punctularia*. The comparison is evidently far-fetched and there should be little hesitation in excluding *Punctularia* from the "Cyphellaceae'. For a recent account of the genus, see Talbot (*1958:* 140).

Skepperiella Pilát *in* Bull. Soc. mycol. France **43**: 56. 1927. — The type species is *Skepperia spathularia* (Berk. & C.) Pat. which is referred to *Rimbachia* Pat. by Singer (*1951:* 741). Apparently it has a lateral stalk, and if so, it cannot belong to the 'Cyphellaceae' as circumscribed in the present paper. It may be that the stalk is only seemingly lateral and is actually strongly excentric, and dorsally attached, in which case it falls within the limits of the 'family' together with *Rimbachia*. Compare Singer (l.c.), "We may, for the sake of comparison, liken *Rimbachia* to *Peziza*, and *Skepperiella* to *Otidea*. Both *Skepperiella* and *Otidea* are weak genera at least in regard to the main distinguishing feature, the spathulate instead of pezizoid habit."

Stereophyllum P. Karst. — Only original species, *Stereophyllum pallens* P. Karst. A later described species is *S. boreale* P. Karst. The latter has been considered conspecific with one of the muscicolous cyphellas.

The type species was insufficiently described (no microscopical details). Karsten himself thought, "Affine videtur *Stereo cyphelloidi* Berk. et C." and his description compares well with a recent one of the latter species published by Welden [*1958:* 42; as *Cotylidia cyphelloides* (Berk. & C.) Welden]. If there is really affinity between the two, it would seem advisable to reconsider the inclusion of *Stereophyllum* (name preoccupied) in *Cotylidia* P. Karst., and to look more closely into the relationship of *Cotylidia cyphelloides* and *Thelephora muscigena* Pers. [≡ *Cantharellus laevis* Fr. ≡ *Cyphella laevis* (Fr.) Lundell].

Trabecularia Bon. — This has for a long time been a forgotten genus. Its generic character places it in the 'Cyphellacae'. Donk (*1951:* 220; *1958:* 14) considers it merely a form of *Merulius tremellosus* Schrad. per Fr. If this disposition is accepted as correct, *Trabecularia* is better excluded from the 'Cyphellaceae' as long as *Merulius* Fr. is not included in that artificial taxon. Some species of *Merulius* have more or less disk- to cup-shaped young fruit-bodies, and in my opinion the cyphellaceous genus *Auriculariopsis* Maire (see p. 76) is difficult to separate from *Merulius*.

Trogia Fr. — The genus was introduced for tropical agarics that are not at all likely to be confused with cyphellas, but in later work Fries extended the limits to include such species as were classed afterwards as *Plicatura* Peck. Compare: "*Trogia* . . . in India orientali hactenus tantum lectum, *Cyphellis* affinitate proximum! [*Trogia crispa* (Pers. per Fr.) Fr., *Cantharellus crispus* (Pers.) per Fr.] . . . cum genuinis *Trogiis* congruit, ut ad idem genus referre non dubitem . . .."—Fries (*1863:* 244). European and North American authors, who did not know the original tropical elements, followed Fries's lead and substituted the name *Trogia* for *Plicatura*. The two genera are widely different; *Trogia* belongs to the agarics (cf. Singer, *1951:* 207).

Urceolus Velen., Novit. mycol. 44. 1939. — A monotypic genus based on *Urceolus sambucinus* Velen., a species with urceolate fruit-body with vein-like gills. Presumably a 'reduced' agaric. Velenovský wrote: "Ego autem censeo, hanc speciem et *Pl*[*eurotus*] *Leightonii* Berk. itidem sub gen. *Urceolus* referendas esse."

Wiesnerina Höhn. — *Peniophorina* Höhn. and *Wiesnerina* have both pin-head-shaped fruit-bodies, sessile with constricted base. They have been placed in the 'Thelephoraceae' (Corticiaceae). Killermann (*1928:* 138, 139; *Peniophorina* as a section of *Peniophora* Cooke) even placed them next to *Corticium* and *Peniophora* in a tribus Corticieae, which he defines as having the "Frk. ausgebreitet . . ."! However, in an artificial system the two genera would probably be sought among the 'Cyphellaceae' and Donk (*1951:* 264) listed them in that connection: they are rather cyphella-like, but with the 'disk' convex (and no evident stalk), as in certain groups consistently referred to the discomycetes. It was not Donk's intention to enter them taxonomically into the 'Cyphellaceae': *Peniophorina* he simultaneously excluded as non-basidiomycetous. Of *Wiesnerina* he noted at that time, but only in manuscript: "*Wiesnerina* Höhn. resembles in general structure *Dimorphocystis capitatus* Corner (Clavariaceae), but it lacks the stalk. Corner's figures (*1950: fs. 170, 171*) of the capitate portion of the fruit-body roughly apply to *Wiesnerina*. However, the cystidia are different in some respects from those described in the three species of *Dimorphocystis* Corner."

In the meantime Boedijn (*1959:* 11) has found that the correct name for *Dimorphocystis* is *Actiniceps* Berk. & Br. and he also includes *Wiesnerina* in that genus. For the present I would not yet subscribe to that solution; it appears that *Wiesnerina*

may be a closely related but different genus. Boedijn, moreover believes that *Actiniceps* belongs to the "Thelephoraceae". This, apparently, should be understood as 'Thelephoraceae *sensu latissimo*', since there is certainly no close relation with the Thelephoraceae as recently emended ('Phylacteriaceae'). Since the fruit-body may be frankly stalked, and the stalk in *Wiesnerina* may be interpreted as present but very short, it might be advisable to refer *Actiniceps* (and *Wiesnerina*) to the artifical family 'Clavariaceae', as has been done for *Dimorphocystis* by Corner.

If the stalk of *Actiniceps* can be imagined so strongly reduced that the fruit-body becomes a sessile, shortly obconical body with the hymenium limited to the convex surface at the top one will arrive at a fruit-body as it occurs in *Wiesnerina*. The latter genus now includes two species, both tropical, which both differ from *Actiniceps* in the cystidia. These are similar in both genera to this extent, that a cystidium from either is thick-walled, somewhat ventricose in the lower half, its lumen sometimes widened there but always abruptly expanded toward the apex. However, in *Wiesnerina*, the surface of the cystidia is densely and regularly studded with papillae all over, except at the extreme tip and around the base. In *Wiesnerina secunda* Höhn. from Java the cystidia tend to swell in KOH solution and in this respect remind one of *Lachnella* (p. 97). I have not studied the Brazilian species *W. horrida* Höhn.

Excluded species

The following enumeration deals with those species that have been referred to the genera listed in Table I as cyphellaceous, but that should be excluded from the 'family'. An exception is made for ascomycetous species included in *Lachnella*. The name *Lachnella* has for a long time been erroneously applied to a genus of discomycetes in various delimitations. On the other hand, cupulate (not strictly laterally or ventrally stalked) species that have been placed in *Dictyolus* and *Leptoglossum* and that are better excluded from the 'family' may also be looked for in this enumeration, which, however, is by no means to be regarded as exhaustive. The synonymy is in most cases not complete.

acericola. — *Nodularia acericola* Peck *in* Rep. New York St. Mus. nat. Hist. **25**: 98. 1873 (n.v.). — *Pezicula acerina* (Peck) Peck *apud* Sacc. & Berl. *in* Atti Ist. veneto VI **3**: 725. 1885; Seav., N. Amer. Cup-fungi (Inop.) 342 *pl. 141 f. 1*. 1951.

Not congeneric with the type species of *Nodularia*, which is synonymous with the type species of *Aleurodiscus*. The above mentioned species is an inoperculate ascomycete; compare Seaver (l.c.).

aeruginascens. — *Cyphella aeruginascens* P. Karst. *in* Hedwigia **28**: 191. 1889. — *Chlorocyphella aeruginascens* (P. Karst.) Keissl. *in* Annal. naturh. Mus., Wien **41**: 159 *f. 1*. 1927.

Fide Santesson (*1952*: 49, 50) = *Pyrenotrichum splitgerberi* Mont. See also under *Chlorocyphella* (p. 40).

agariciformis. — *Cyphella agariciformis* Pilát *in* Hedwigia **66**: 262 *f. B.* 1926
This species was described from Bohemia and found on stalks of *Juncus glomeratus.* Judging only from the original account I suggest that it is the same as *Pistillina typhae* (Höhn.) Donk. The general shape of the fruit-body, the consistency (subgelatinous), the spores ("langlich-elliptisch, nach unten langsam zugespitzt, 8–9 μ lang, 3,2–3,6 μ breit"), as well as the habitat, all point in this direction. For a note on the genus *Pistillina* Quél., see above (p. 43).

annulatus. — *Peziza annulata* Holmskj., Fung. dan. **2**: 30 *pl. 13.* 1799 (devalidated name). — *Peziza annulata* Holmskj. *per* Fr., Syst. mycol. **2**: 106. 1822. — *Solenia annulata* (Holmskj. per Fr.) Fr., Hym. europ. 597. 1874. — *Henningsomyces annulatus* (Holmskj. per Fr.) O.K., Rev. Gen. Pl. **3** (2): 483. 1898.
As far as I have been able to find out, a fungus as yet unidentified which may represent some inoperculate discomycete. Fries (*1874:* 597) had not seen any specimen when he referred it to *Solenia:* "Non vidi, sed *S. anomalae* ita affinis, ut de genere non dubitem." I am not al all convinced that Fries was correct and consider the species as 'lost'.

antiquatus. — *Peziza antiquata* Batsch, Elench. Fung. 119. 1783; Cont. 1: 203 *pl. 27 f. 141.* 1786 (devalidated name).
Fries (*1822:* 36) thought of *Thelephora* Ehrh. ex Fr. (original wide sense) in connection with this fungus, which has dropped out completely from literature. In shape it is 'cyphelloid', or, rather, *Cytidia*-like. I have compared Batsch's account carefully with *Cytidia salicina* (Fr.) Burt, dried *Exidia recisa* (Ditm. per S. F. Gray) Fr., and forms of some species of *Stereum* Pers. per S. F. Gray, but could not decide on any of these, although the fungus may well be hymenomycetous. Another 'lost' species.

applicatus. — *Merulius applicatus* Lév. *in* Ann. Sci. nat. (Bot.) II **19**: 214 *pl. 7 f. 2.* 1843. — *Cantharellus applicatus* (Lév.) Fr., Hym. europ. 461. 1874. — *Dictyolus applicatus* (Lév.) Quél., Ench. Fung. 140. 1886.
A 'lost' species that may belong to the agarics; compare *Schizophyllum commune* Fr. per Fr. (the substratum being rotting leather).

axillaris. — *Peziza axillaris* C. Nees, Syst. Pilze 258 *pl. 37 f. 267.* 1816 & Ueberbl. 67. 1817 (devalidated name). — *Peziza axillaris* C. Nees *per* Pers., Mycol. europ. **1**: 314. 1822. — *Humarina axillaris* (C. Nees per Pers.) Seav., N. Amer. Cup-fungi (Op.) 124. 1928.
Sprengel (*1827:* 511) listed *Peziza axillaris* as a possible synonym (variety) of *Cyphella muscicola* Fr. The original fungus is apparently a discomycete. Some authors admit it as a good species (cf. Seaver, l.c.), but Dennis (*1956:* 114), after a discussion, concludes that it is still doubtful.

australis. — *Cyphella australis* Speg. *in* Ann. Soc. cient. argentina **12**: 29. 1881. — *Chaetocypha australis* (Speg.) O.K., Rev. Gen. Pl. **2**: 847. 1891.

From the description ["pileo . . . extus (sub lente tantum) minutissime pruinuloso, cinereo v. cinereo-glauco"], this might be a species of *Favolaschia* (see p. 42), like *F. saccharina* Pat. Although there is no explicit statement about the cup being 'compound', the words "sparsa v. hinc inde 2–5 gregaria" perhaps mean that fruit-bodies with 2–5 tubes were present.

boninensis. — *Dictyolus boninensis* S. Ito & Imai *in* Trans. Sapporo nat. Hist. Soc. **16**: 20. 1939.

Singer (*1945:* 191) thinks that it seems to belong to the group of *Campanella caerulescens* (Berk. & C.) Sing. A lamellate species and presumably agaric.

campanula. — *Peziza campanula* C. Nees is cited by Fries (*1874:* 665) as a synonym of *Cyphella sulphurea* (Batsch) per Fr., which, if correct, would make it an inoperculate discomycete (*Belonioscypha* Rehm). However, Fries certainly misinterpreted *Peziza sulphurea* Batsch (see p. 63), and it is likely that the species he had in mind, as well as the original *P. campanula*, belongs to *Calyptella*. This question will be discussed at greater length on a future occasion.

cervinus. — *Peziza cervina* Pers., Syn. Fung. 647. 1801 (devalidated name); not *P. cervina* Pers., Mycol. europ. **1**: 254. 1822; not *P. cervina* (Fuck.) Sacc., Syll. Fung. **8**: 84. 1889.

Persoon (*1822:* 280) cited this name as a possible synonym of *Peziza digitalis* A. & S. According to Fries (*1822:* 187) it belongs to *Cenangium ferrugineum* Fr. per Fr., an inoperculate discomycete which Rehm (*1889:* 227) calls *Cenangium abietis* (Pers.) Rehm = *C. abietis* (Pers.) per Duby.

chrysophaeus. — *Peziza chrysophaea* Pers., Syn. Fung. 674. 1801; Ic. pict. 17 *pl. 8 fs. 1, 2.* 1804. — *Stictis chrysophaea* (Pers.) *per* Pers., Mycol. europ. **1**: 335. 1822; Fr., Syst. mycol. **2**: 194. 1822. — *Ocellaria chrysophaea* (Pers. per Pers.) Quél., Ench. Fung. 332. 1886; Rehm *in* Rab., Krypt.-Fl., Pilze **3**: 135. 1888.

Secretan (*1833:* 303) listed this as a possible synonym of *Peziza amorpha* Pers. = *Aleurodiscus amorphus* (Pers. per Purt.) J. Schroet. This is incorrect; *Peziza chrysophaea* is more likely to be a discomycete: compare Rehm (l.c.)

cinereofuscus. — *Peziza cinereofusca* Schw. *in* Schr. naturf. Ges. Leipz. **1**: 119. 1822; Fr., Syst. mycol. **2**: 97. 1822. — *Cyphella cinereofusca* (Schw.: Fr.) Sacc. *in* Michelia **2**: 303. 1881; Sacc. & Roum. *in* Roum., Fungi gall. exs. No. 1504. 1881; Roum. *in* Rev. mycol. **3**/No. 12: 5. 1881. — *Velutaria cinereofusca* (Schw.: Fr.) Bres. ("in litt.") *apud* Rehm *in* Rab., Krypt.-Fl., Pilze **3**: 645. 1892. — *Calyptella cinereofusca* (Schw.: Fr.) Big. & Guill., Fl. Champ. France, Compl. 482. 1913.

Two quite different fungi have been associated with this name. Saccardo identified it for some time with a species of the 'Cyphellaceae' that will be discussed on a later occasion. Seaver (*1951:* 275) agrees, stating: "It is a *Cyphella*." This interpretation is here rejected and von Schweinitz's species excluded from the Basidiomycetes.

Bresadola and Rehm referred it to the inoperculate discomycetes and Rehm (l.c.) gives what appears to be a good description of Bresadola's interpretation.

confusus. — *Porotheleum confusum* Berk. & Br. *in* Ann. Mag. nat. Hist. V **1**: 24. 1878.

Fide Rea (*1922:* 703) and Reid (*1957:* 134) = *Odontia sudans* (A. & S. per Fr.) Bres. = *Dacryobolus sudans* (A. & S. per Fr.) Fr. For a note on *Dacryobolus*, see page 41.

convolutus. — *Cyphella convoluta* Cooke *in* Ann. New York Acad. Sci. **1**: 179. 1878.

Apparently not a basidiomycete: Burt (*1914:* 380) reports that "the 'basidia' are filiform and only 1-spored."

cookei. — For *Cyphella cookei* Sacc. & P. Syd., see *Cyphella fili(ci)cola* Cooke.

crucibulum. — *Merulius crucibulum* Fr., Obs. mycol. **1**: 99. 1815 (devalidated name). — *Xylomyzon solare* var. *crucibulum* (Fr.) *per* Pers., Mycol. europ. **2**: 29. 1825. — *Cantharellus crucibulum* (Fr. per Pers.) Fr., Epicr. 369. 1838. — *Leptotus crucibulum* (Fr. per Pers.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **32**: 243. 1879. — *Dictyolus crucibulum* (Fr. per Pers.) Quél., Ench. Fung. 142. 1886.

Another 'lost' species. There is no reason for dragging the name along in connection with *Leptotus* or any other group of 'Cyphellaceae'. It is here suggested that it may be a synonym of *Paxillus panuoides* (Fr. per Fr.) Fr., and more particularly, a name given to one of those poorly developed forms occurring in cellars and mines. Pilát (*1948a:* 18) cites a specimen (PR) named "*Agaricus crucibulum* Corda" as a synonym of "*Crepidotus*" *panuoides* (Fr. per Fr.) Pilát. It would seem that Fries himself (*1863:* 212) thought of that species when he wrote about *Cantharellus crucibulum*, ". . . caute distinguendus a *Paxillo panuoide*." From the same account it also appears that it was found in "locis suffocatis".

cruentus. — *Thelephora cruenta* Pers., Syn. Fung. 575. 1801 (devalidated name). — *Thelephora cruenta* Pers. *per* Fr., Syst. mycol. **1**: 444. 1821, misapplied. — *Corticium cruentum* (Pers. per Fr.) J. Schroet. *in* Krypt.-Fl. Schles. **3** (1): 423. 1888, misapplied. — *Lomatina cruenta* (Pers. per Fr.) P. Karst., Finl. Basidsv. 156. 1899, misapplied. — *Cytidia cruenta* (Pers. per Fr.) Herter *in* KryptFl. Brandenb. **6**: 83. 1910, misapplied.

Thelephora cruenta var. *sanguinea* A. & S., Consp. Fung. nisk. 277. 1805, misapplied, ≡ *Thelephora cruenta* Pers. (basinym).

Type.—L 910.267–694.

Persoon's description of *Thelephora cruenta* Pers. is very short. This is apparently why the name has been misapplied. The description ("glabra coriacea tuberculata, sanguinea-rubra. Ad cortices arborum . . .") suggests *Hymenochaete mougeotii* (Fr.) Cooke, and material in Persoon's herbarium is in agreement with such a determination. According to the "Synopsis Fungorum" the type (L 910.267–694) was sent

to Persoon by Ludwig. It is labelled in Persoon's handwriting "*Thelephora cruenta* / —— *punicea*." The second name was evidently added on a later occasion. The collection is a good specimen of *Hymenochaete mougeotii*. A second specimen (L 910.277–344) represents the same species. It is labelled, "*Thelephora*. / in cortice emortuo *Pini abietis*" in Mougeot's handwriting. Persoon wrote "*cruenta*" after '*Thelephora*'. Lloyd marked this sheet as "type", which is erroneous because the type came from Germany and was sent by Ludwig, before Mougeot started to send specimens to Persoon from the Vosges. A third specimen (L 910.277–341) is labelled by Chaillet, "*Thelephora cruenta* Pers.? Elle me paroit différer par l'absence des Papilles. du reste elle me paroit entièrement semblable. . . . 1818 No. 46." Persoon added "*T. punicea* Alb. et Schwein." The specimen is again *Hymenochaete mougeotii*. It is thus well established (i) what species Persoon described as *Thelephora cruenta*, and (ii) that afterwards he thought that he recognized. *T. punicea* A. & S. in his species.

The first authors who erroneously interpreted Persoon's species (which they called *Thelephora cruenta* var. *sanguinea*) were von Albertini & von Schweinitz. Their description and indication of habitat leave not the slightest doubt that they were dealing with the species Fries would later call *Thelephora salicina* Fr. They added a second variety (which is why they also gave the typical fungus a varietal name), viz. *T. cruenta* var. *roseo-rubra* A. & S.; it is not easy to determine with certainty and may be left out of further account.

When Fries re-published *Thelephora cruenta* in the starting-point book he, too, misapplied it. When he became aware of his error he renamed his interpretation *Thelephora sarcoides* Fr. This species will be separately discussed below. At the same time Fries (*1828:* 188) refused to take up Persoon's name for the correct species, which he renamed *Thelephora mougeotii*, dropping the name *T. cruenta* altogether. This was when he had seen Persoon's species as distributed by Mougeot & Nestler, Stirpes Crypt. vogeso-rhenanae, Fasc. 6: No. 581. 1818, the label of which runs: "581. *Thelephora cruenta* Pers. Syn. Fung. p. 575. Ad ramos exsiccatos *Pini Piceae*. Autumno." We have seen above that Persoon had so named a specimen he had received from Mougeot. Fries explained his reluctance to accept the name *T. cruenta* thus:

"Color in meis speciminibus [Moug. et Nestl.! exs. n. 581.] haud cruentus. — Quid *Th. cruenta* Pers., Syn. p. 575. monentibus A. S., e tribus verbis vix dijudicandum. Ipsi huc retulerunt *Th. salicinam* et *T. sarcoidem*. Alia vidi specimina hujus nominis, quae *Phlebiam* spectant. Cel. Sprengel, qui forsan a Ludwigio habuit, ad *Th. polygoniam* refert. Ipse ducibus A. S. in S[yst]. M[ycol]. *Th. sarcoidem* pro *T. cruenta* habui. Cel. Mougeot dedit praesentum, cujus specimina divulgata omnem confusionem tollant, quare nomen hujus merito ferat species nitidissima! *Th. cruentae* nomen prorsus negligendum. In *Myc. Eur.* tres diversissimas species complectitur."[12]—Fries (*1828:* 188).

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[12] In later work Persoon (*1822:* 140) not only combined his own species with the one described by von Albertini & von Schweinitz, but he also admitted as a variety *T. cruenta* var. *roseorubra* A. & S., which Fries referred to *T. sarcoides* Fr.

Thelephora cruenta has been taken up again in von Albertini & von Schweinitz's sense by Schroeter, Karsten, Herter, and other authors. It will be clear from what has been said that this misinterpretation should be discontinued, and that *T. cruenta* should be removed from the genus *Cytidia*.

Since Fries did not exclude the original fungus from his treatment of *Thelephora cruenta* in the starting-point book, the name should be applied in its original sense; hence the following recombination, which now appears to be the correct name for *Hymenochaete mougeotii*: **Hymenochaete cruenta** (Pers. per Fr.) Donk, *comb. nov.* (basinym, *Thelephora cruenta* Pers., Syn. Fung. 575. 1801 *per* Fr., Syst. mycol. **1**: 444. 1821).

A question that arises in this connection is what *Thelephora punicea* A. & S. really represents. The current interpretation identifies it with a species of *Tomentella* Pat., now called *T. punicea* (A. & S. per Fr.) J. Schroet. (for a description, see Bourdot & Galzin, *1928:* 491). This can hardly be correct for the original description (von Albertini & von Schweinitz, *1805:* 278) contains, *inter alia*, "Membrana circumscripta, diametro 1½–3 unc. fere aequans, appressa vel subreflexa . . .", which excludes any known red species of *Tomentella!* The substratum is given as ". . . ad cortices fagineos . . . et abietinos", and, if correct, would exclude *Hymenochaete cruenta*, or point to a mixture of species, since *H. cruenta* does not occur on beech. If one narrows the original concept to the fungus on the coniferous substratum, *Thelephora punicea* may perhaps be listed as a synonym of *Hymenochaete cruenta*.

c u p r e s s i. — *Merulius cupressi* Schw. *in* Schr. naturf. Ges. Leipz. **1**: 92.1822. — *Cyphella cupressi* (Schw.) Fr., Elench. **2**: 29. 1828.

This is a gall: compare Berkeley & Curtis (*1856:* 207); Burt (*1914:* 380), and Lloyd (*1911:* 497 *f.* 385).

c u p u l a r i s. — *Merulius cupularis* Wahlenb., Fl. lapp. 529 *pl. 30 f. 6.* 1812 (devalidated name). — *Cantharellus cupularis* (Wahlenb.) *per* Fr., Syst. mycol. **1**: 325. 1821. — *Merulius cupularis* (Wahlenb. per Fr.) Pers., Mycol. europ. **2**: 25. 1825. — *Arrhenia cupularis* (Wahlenb. per Fr.) Fr., Summa Veg. Scand. **2**: 312. 1849; Strauss *in* Sturm, Deutschl. Fl., Pilze Hft. 33–34: 9 *pl. 5.* 1853. — *Dictyolus cupularis* (Wahlenb. per Fr.) Pat., Essai taxon. Hym. 131. 1900.

This species was redescribed once after 1821, by von Strauss (l.c.). The original description reads like that of one of the minute species of *Resupinatus* (C. Nees) per S. F. Gray, and Fries seems to have thought of that, too: "Ex Wahlenbergii exemplaribus pro juniore statu *A[garici] applicati* facile haberem, sed Straussii vere distincta." Still later he is even more positive (Fries, *1863*: 212): ". . . at examinatis archetypis auctoris meram *A. applicati* forman juvenilem censeo." *Pleurotus kavinii* Pilát is one of the forms around *Resupinatus applicatus* (Batsch per Fr.) S. F. Gray that has few (5–8), rather low gills and that reminds one of *Merulius cupularis* in sufficient respects to suggest that Wahlenberg's species might well be a member of *Resupinatus*.

cyphelloides. — *Laschia cyphelloides* J. Rick (in herb.); Lloyd, Mycol. Notes **5**: 802, 1918 (as a synonym). — *Rimbachia cyphelloides* (J. Rick) *ex* Lloyd, Mycol. Writ. **5**: 802 *fs. 1245, 1246.* 1918. — *Arrhenia cyphelloides* (J. Rick ex Lloyd) Sing. *apud* Dennis *in* Kew Bull. **1952**: 327 (as a synonym).

See under *Arrhenia flabellula* (Berk. & C. ex Cooke) Dennis.

discoideus. — *Cyphella discoidea* Cooke *in* Grevillea **12**: 85. 1884.

Cunningham (*1953a:* 281; *1953b:* 187) reports that examination of the type showed it to consist of empty egg-cases of a spider.

Type.—New Zealand, Napier (W. Colenso 630, K)!

dryophilus. — *Peziza dryophila* Pers., Mycol. europ. **1**: 265. 1822.

Fide Fries (*1822:* 105), a form of *Peziza punctiformis* Fr. = *Cyphella punctiformis* (Fr.) P. Karst. Later authors have not upheld this disposition and Rehm (*1893:* 900) cites Persoon's fungus as belonging to the inoperculate discomycete *Lachnum fuscescens* (Pers. per Fr.) P. Karst. = *Dasyscypha fuscescens* (Pers. per Fr.) Rehm.

filicicola. — See *filicola.*

filicola. — *Cyphella filicola* Cooke *in* Grevillea **14**: 129. 1886; Sacc. & P. Syd. *in* Sacc., Syll. Fung. **14**: 231. 1899 ("*filicicola*"); not *C. filicicola* Berk. & C. *apud* Berk. *in* Grevillea **2**: 5. 1873. — *Cyphella pteridophila* Sacc., Syll. Fung. **6**: 683. 1888 ("Cooke"); Lloyd, Mycol. Writ. **6**: 975. 1920 ("*pteridophyta*"). — *Cyphella cookei* Sacc. & P. Syd. *in* Sacc., Syll. Fung. **14**: 231. 1889.

Fide Cunningham (*1953a:* 282; *1953b:* 188) the type consists of empty egg-cases of "some moth or butterfly".

fimicola. — *Arrhenia fimicola* Baglietto *in* Comm. Soc. critt. ital. **2**: 264. 1865 (n.v.); Fr., Hym. europ. 462. 1874.

The following note shows that this is another species to be excluded from the basidiomycetes:

"*Arrhenia fimicola* Bagl. / Sul fimo pecorina (non porcino) nei pascoli piu elevati presso i ghiacciai del Monte Rosa. Agosto 1886 ([Caresti] n. 1181). / Questa pretesa specie non è che une *Peziza*, in cui l'imenio è stato di distrutto. Dalle setole marginali potrebbe forse rifervisi alle *Lachnea thelebolоides* Alb. et Schw. Gli esemplari esaminati sono, a detta di Carestia, identici a quelli spediti al Baglietto, cha furono raccolti nelle medesime localita e sul fimo ovino e non porcino, come indica Fries negli Hym. Europ. p. 462."—Bresadola & Saccardo (*1897:* 245–246).

flabellulum. — *Favolus flabellulum* Berk. & C. ("in Herb."); Cooke *in* Grevillea **19**: 105. 1891 (as a synonym). — *Laschia flabellula* (Berk. & C.) *ex* Cooke *in* Grevillea **19**: 105. 1891. — *Arrhenia flabellula* (Berk. & C. ex Cooke) Dennis *in* Kew Bull. **1952**: 327 *f. 2.*

Redescribed by Dennis (l.c.) who also reports, that according to Singer "*Arrhenia cyphelloides* Lloyd" = *Rimbachia cyphelloides* (J. Rick) ex Lloyd is a synonym. This species hardly fits in *Arrhenia* (see p. 27); it seems better placed in *Campanella*

P. Henn. (cf. p. 40) on account, for instance, of its substratum (on logs) and gelatinous consistency.

f l o c c u l e n t u s.

Thelephora populina Fr., Elench. **1**: 184. 1828 ("ined."; as a synonym); not *Thelephora populina* Sommerf., Suppl. Fl. lapp. Wahlenb. 284. 1826. — Herbarium name for *Thelephora flocculenta* Fr.

Thelephora flocculenta Fr., Elench. **1**: 184. 1828, in part. — *Corticium flocculentum* Fr., Epicr. 559. 1838. — *Terana flocculenta* (Fr.) O.K., Rev. Gen. Pl. **2**: 872. 1891. — *Auricularia flocculenta* (Fr.) P. Henn. *in* Verh. bot. Ver. Brandenb. **37**: 5. 1896 (nomen provisorium), misapplied. — *Cyphella flocculenta* (Fr.) Bres. *in* Ann. mycol., Berl. **1**: 111. 1903, misapplied. — *Cytidia flocculenta* (Fr.) Höhn. & L. *in* S.B. Akad. Wien (Math.-nat. Kl., Abt. I) **116**: 758. 1907, misapplied. — *Auriculariopsis flocculenta* (Fr.) Sacc. & Trott. *in* Sacc., Syll. Fung. **21**: 423. 1912, misapplied.

Type.—Sweden, Femsjö (hb. Fr.-UPS).

As to the identity of this fungus I have come to the conclusion that it is not the one currently connected with the name *Cytidia flocculenta*, but that it is a synonym of *Corticium evolvens* (Fr. per Fr.) Fr. = *C. laeve* (Pers. per Fr.) Fr. The following lines will show some of the reasons for this conclusion.

Cyphella ampla, with which *Corticium flocculentum* has been identified by J. Schroeter and many later authors, is exceedingly rare in Sweden, if it occurrs in that country at all: I do not remember coming across even a single specimen collected in Sweden in the herbarium at Uppsala.

Moreover, a specimen is available that appears entitled to be regarded as type; it is labelled in Fries's handwriting, "*Corticium flocculentum* Fr. / Femsjö / Rudera misera." The fungus has completely disappeared from the substratum except for some tiny tissue fragments at one or two points of attachment of fruit-bodies. One of these fragments yielded hyphae of *Corticium evolvens*. Dr. J. Eriksson, to whom I showed the slide, agrees with this determination.

Fries's rather elaborate account, as well as the species with which he compared *Thelephora flocculenta*, also points in the direction of *Corticium evolvens*, and definitely not to *Cyphella ampla*. The one discrepancy may be the alleged colour of the fresh fruit-body, ". . . hymenio . . . sanguinorufo e pruinâ cervino . . . hymenio . . . intense sanguineo, sed hic color tantum in humectata apparet; siccum enim, hymenium laeve subcervinum! . . . Hymenium . . . demum . . . colore cinereo-cervino memorabile." Yet, I think it justified to accept *Thelephora flocculenta* as one of the several names under which Fries described *Corticium evolvens*. In any case there is no reason to retain the name for *Auriculariopsis ampla*.

I have thought of the possibility that *Thelephora flocculenta* might be *Cytidia salicina* (Fr.) Burt. The latter fungus has been found on rare occasions on species of *Populus*, and "Ad truncus *Populi*" is the substratum indicated for *T. flocculenta*. However, the microscopical details of the hyphae from the type preclude the possibility of this synonymy.

flos-albus. — *Cyphella flos-albus* Velen., České Houby 767 *f. 136: 10.* 1922 ("*flos albus*"; for Latin translation, see Pilát, Velen. Sp. nov. Basid. 280. 1948); Pilát *in* Ann. mycol., Berl. **22**: 206 *pl. 1 f. 10.* 1924.

The distinguishing features are in the thin, slender stalk, which is made villose from long patent hairs and which expands abruptly into the completely naked cup. Collected on rotten roots in a hollow trunk.

The striking difference in villosity between the stalk and the cup suggests that, contrary to the usual situation in the 'Cyphellaceae', the naked surface of the cup is of a radically different nature from that of the stalk, and this, in my opinion, indicates that the outer surface of the cup is covered by the hymenium. This assumption makes of *Cyphella flos-albus* an agaric species with upturned cap and smooth hymenophore at the nether (= outer) surface, comparable to—if not identical—with *Peziza gibba* A. & S., a species of *Mycena sensu lato*, which is discussed below.

foliicola. — *Cyphella foliicola* Vainio *in* Ann. Sci. fenn. A **15** (6): 83. 1921. — *Chlorocyphella foliicola* (Vainio) Keissl. *in* Ann. naturh. Mus., Wien **41**: 159. 1927. — *Pyrenotrichum foliicola* (Vainio) R. Sant. *in* Symb. bot. upsal. **12** (1): 41. 1952.

See under *Chlorocyphella* (p. 40).

friesii. — *Porotheleum friesii* Mont. *in* Ann. Sci. nat. (Bot.) II **5**: 339. 1836; Fr., Epicr. 504. 1838. — *Porotheleum fimbriatum* var. *friesii* (Mont.) Quél., Fl. mycol. France 428. 1888.

If not considered a distinct species of *Porotheleum*, then it has often been included (recently, for instance, by W. B. Cooke, *1957:* 684) in *Porotheleum fimbriatum* (Pers. per Fr.) Fr. = *Stromatoscypha fimbriatum* (Pers. per Fr.) Donk. Lloyd (*1917:* 740) took it to be based on the young, papillate condition. The original description does not support such a disposition and a portion of the type (K) shows this to be a resupinate species of Corticiaceae to which I intend to return on a future occasion.

fulvus. — *Porotheleum fulvum* Ell. & Ev. *apud* Langl., Cat. Fl. Basse-Louisiana 33. 1887 (nomen nudum; n.v.).

Fide Lentz (*apud* Cash, *1953:* 327) = *Hypocrea citrina* (Pers. per Fr.) Fr.

gibbus. — *Helotium gibbum* A. & S., Consp. Fung. nisk. 350 *pl. 4 f. 1.* 1805 (devalidated name). — *Perona gibba* (A. & S.) *per* Pers., Mycol. europ. **2**: 3. 1825. — *Helotium gibbum* (A. & S. per Pers.) Fr., Syst. mycol. **3** (Ind.): 94. 1832. — *Omphalia gibba* (A. & S. per Pers.) Pat., Tab. anal. Fung. **2**: 26. 1887 (legend to *f. 560* reads, "*Ag*[*aricus*] (*Omphalia*) *gibba* (A. et Sch.) Pat."). — *Agaricus gibbus* (A. & S. per Pers.) Pat., see preceding name. — *Cyphella gibba* (A. & S. per Pers.) J. Schroet. *in* Krypt.-Fl. Schles. **3** (1): 434. 1888. — *Phialea gibba* (A. & S. per Pers.) Sacc., Syll. Fung. **8**: 271. 1889. — *Delicatula gibba* (A. & S. per Pers.) Pat., Essai taxon. Hym. 157. 1900. — *Cyphella infundibuliformis* Fr., Summa Veg. Scand. **2**: 336. 1849. — *Chaetocypha infundibuliformis* (Fr.) O.K., Rev. Gen. Pl. **2**: 847. 1891. —

"*H*[*elotium*] *umbonatum* A. S.": Fr., Summ. Veg. Scand. **2**: 354. 1849 (error; as a synonym).

Descriptions & illustrations.—Patouillard, 1887, l.c.; Cejp *in* Atl. Champ. Eur. **4**: 144 *pl. 54 fs. 9–11.* 1938 (*Delicatula*).[13]

This fungus has been a puzzle since its publication, and it is often referred to the discomycetes as an insufficiently known species. Schroeter (l.c.) placed it in *Cyphella*, but apparently did so only by judging from the original account.

Patouillard's interpretation of the species as an agaric is doubtless correct, although the fungus he described may possibly be a closely related species, rather than the same one; the original account is sufficiently detailed and clear for us to accept Patouillard's fungus as conspecific. The 'cup' is the cap of an agaric, with smooth hymenophore covering the outside of the cup; the nipple at the bottom of the cup is the umbo on the cap, which turns inside out early in development.

Mycena crispula (Quél.) Kühner sensu Kühner (*1938:* 642 *f. 230*) and Kühner & Romagnesi (*1953*: 117 *f. 61*) agrees in several respects. It has often a very pronounced nipple-like umbo; the gills may be strongly reduced or often completely lacking, rendering the hymenophore smooth; the cup has a pronounced tendency to turn up when the fruit-body matures; and the stalk is patently villose. This species may serve for the present as the link which attaches *Peziza gibba* to the agarics. *Cyphella flos-albus* Velen., q.v., is apparently another species from this group, if not conspecific with *Peziza gibba.*

The correct position of species like *Mycena crispula* is not easy to determine. This is not the place to discuss extensively the generic position of such species, among which I would tentatively include *Peziza gibba.* Modern authors are far from unanimous on this point and place *Mycena crispula* in *Mycena* (A. H. Smith, *1947*: 87), *Delicatula* Fayod (Kühner & Romagnesi, *1953:* 117), *Marasmiellus* Murrill[14], and *Omphalia* (Fr.) Kummer = *Omphalina* Quél. (Josserand, *1937:* 92). Wherever it

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[13] What Rea (*1927:* 217) described under the name *Omphalia gibba* may not be the same species and appears more typically 'mycenoid': he describes the cap as plane with a gibbous centre and borrows the qualification "villose and soon becoming depressed" from Patouillard.

[14] Singer (*1951:* 298) places *Mycena crispula* as *Marasmiellus crispulus* (Quél.) Sing. in *Marasmiellus* sect. *Candidi* (Kühner) Sing. subsect. *Hirsuti* (Kühner) Sing. (name not validly published). I would recognize a section here:

Mycena sect. **Hirsutae** (Kühner) ex Donk, *nov. sect.*

Mycena [subsect.] *Hirsutae* Kühner, Genre *Mycena* 638. 1938 (without Latin description). — *Marasmiellus* subsect. *Hirsuti* (Kühner) Sing. *in* Lilloa **22**: 298. 1951 (without Latin description).

Affinis *Mycenae* sectioni *Candidae* Kühner, sed minuscula, pileo stipitique pilis distinctis longis patentibus dense villoso conspicua. Lamellae satis horizontales, saepe arcuato-concavae, deinde frequenter decurrentes, saepe angustae vel venas simulantes vel omnino absentes. Hymenium cystidiis destitutum.

Typus sectionis.—*Mycena mauretanica* (Maire) Kühner.

Examples.—See Kühner, l.c. Additional species seem to be *Helotium hirsutum* Tode and *Peziza gibba* A. & S.

will go, it should be remembered that *Peziza gibba* may follow, and, if so, that the latter is the type of the earlier name *Perona* Pers. (1825).[15]

Quélet (*1886:* 216) listed *Cyphella abieticola* P. Karst. as a synonym of *Cyphella infundibuliformis*. This is evidently an error. Under *Peziza tubaeformis* Wallr. its author (Wallroth, *1833:* 492) cited *Helotium gibbum* as a synonym (with a note of interrogation). The two fungi seem to be widely different; *P. tubaeformis* may belong to *Calyptella*.

glaucus. — For *Leptotus glaucus* (Batsch per Fr.) Maire, see under *Leptoglossum* (p. 42).

heveae. — *Cyphella heveae* Mass. *in* Kew. Bull. **1914**: 157. — *Dasyscyphus heveae* (Mass.) Dennis & Reid *in* Kew. Bull. **1957**: 287 *f. 1*.

The type appears to represent an inoperculate discomycete and Dennis & Reid (l.c.) have referred it to the genus *Dasyscyphus* S. F. Gray.

hyalinus. — *Peziza hyalina* Pers., Obs. mycol. **1**: 28. 1796 (in obs. under *P. corticalis*); Syn. Fung. 655. 1801; (devalidated name). — *Peziza hyalina* Pers. *per* Pers., Mycol. europ. **1**: 316. 1822; Fr., Syst. mycol. **2**: 102. 1822. — *Hyaloscypha hyalina* (Pers. per Pers.) Boud., Disc. Europ. 127. 1907; Dennis, Rev. Brit. Hyalosc. (*in* Mycol. Pap. C.M.I. **32**:) 70 *f. 77*. 1949.

This was listed as a synonym (variety) of *Peziza villosa* Pers. by Sprengel (*1827*: 505). For a description and discussion of this inoperculate discomycete, see Dennis (l.c.).

hydnoideus. — *Porotheleum hydnoideum* Berk. *in* Grevillea **1**: 70. 1872.

The description reads rather like one of *Odontia sudans* (A. & S. per Fr.) Bres. = *Dacryobolus sudans* (A. & S. per Fr.) Fr. See also discussion under *Dabryobolus* Fr. (p. 41).

infundibuliformis. — For *Cyphella infundibuliformis* Fr., see *Peziza gibba* A. & S.

juranus. — *Dictyolus juranus* Quél. & Pat. *apud* Quél. *in* C.R. Ass. franç. Av. Sci. **16**: 589 *pl. 21 f. 8*. 1888. — *Cantharellus juranus* (Quél. & Pat. apud Quél.) Sacc., Syll. Fung. **9**: 65. 1891. — *Leptoglossum juranum* (Quél. & Pat. apud Quél.) Kühner & Rom., Fl. anal. Champ. sup. 77. 1953 (incomplete reference).

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[15] Donk (*1949:* 325–326) concluded that *Perona* Pers. was illegitimate in view of an earlier homonym, *Peronia* [Delar. in] Red. 1812, and, therefore, withdrew an earlier proposal to conserve *Omphalina* Quél. [the 'correct' name for *Omphalia* (Fr.) Kummer] against *Perona* Pers. However, Rogers (*1950:* 28–29) thinks that there is no question of homonymy in this case In view of another remark by Rogers, it may be pointed out that *Peziza gibba* was included in *Omphalia* by Patouillard and that it falls within *Omphalina* Sect. *Integrellae* (Fr.) Quél. if that genus is used in the Friesian sense. The correct name for *Perona* Pers. now appears to be *Helotium* Tode per Fr., but as I will discuss in a forthcoming note, that name, as one given to a basidiomycetous genus, is better rejected in favour of the name of a discomycetous genus *Helotium*. This would bring *Perona* Pers. into prominence once more, if it is to be held legitimate.

Not known to modern authors. The original account calls to mind *Leptoglossum bryophilum* (Pers. per Fr.) Ricken as recently described by Kühner (*apud* Kühner & Romagnesi, *1954:* 77 *f.* 1), but it differs in being smaller, in growing on rotten wood (instead of on living mosses), and in having, presumably, more constant and better developed gills. I would rather exclude it from the 'Cyphellaceae' as an agaric species.

keithii. — *Porotheleum keithii* Berk. & Br. *in* Ann. Mag. nat. Hist. V **1**: 24. 1878.

This is in any case not a *Porotheleum* = *Stromatoscypha*. The very short description suggests some species of the Corticiaceae, perhaps a papillose form of *Corticium lividum* (Pers. per Fr.) Fr. = *Phlebia livida* (Pers. per Fr.) Bres.

laxus. — *Thelephora laxa* Pers., Mycol. europ. **1**: 143. 1822.

Type.—L 910.267–613. Sent in by Mougeot as "*Thelephora* / Ecorce des Hêtres mors [!]". Persoon wrote on the label, "[*Thelephora*] *laxa* Myc. Europ. 1 p. 148 [= 193]. / *Th. evolvens* var. δ Fries. Elench. fung. p. 182."

Thelephora laxa has been cited as a synonym of *Corticium amorphum* (Pers. per Purt.) Fr. = *Aleurodiscus amorphus* (Pers. per Purt.) J. Schroet. by Fries (*1874:* 648; with a point of interrogation) and Saccardo (*1888:* 606). The description suggests this species, but examination of the type leads to a different conclusion.

The original description (Persoon, *1822:* 143) indicated the type locality as, "Hab. in summitatibus montium Vogesiorum." The specimen indicated above as type agrees very closely with the original description and was found by Mougeot, which means, in the Vosges. Looking at the specimen with a low-power lens, one can easily understand why Persoon stated, "Affinitatem habere videtur cum *Peziza amorpha*." However, microscopical examination showed it to belong to *Corticium evolvens* (Fr. per F.) Fr. = *C. laeve* (Pers. per Fr.) Fr. Bresadola (*apud* Saccardo & Bresadola, *1900:* 427) had already come to that conclusion when he referred *Thelephora laxa* as "status juvenilis" to "*Corticium leve* Pers. non. Fr."

Another specimen (L 910.267–608) also sent in by Mougeot was annotated by Persoon himself as "[*Thelophora*] *laxa*? an fungus bene evolutus?" It shows *Peniophora polygonia* (Pers. per Fr.) Bourd. & G. — *Cryptochaete polygonia* (Pers. per Fr.) P. Karst. A third specimen (L 910.267–65) annotated in Persoon's handwriting, "Prope Parisios. / *Thelephora*? *laxa*" does not now yield anything he could have had in mind.

lichenicola. — *Cyphella lichenicola* Keissl. *in* Ann. naturh. Mus., Wien **41**: 158. 1927 & *Chlorocyphella lichenicola* Keissl., op. cit. pp. 158, 159 (herbarium names listed as synonyms).

Keissler listed these names as synonyms of *Chlorocyphella aeruginascens* (P. Karst.) Keissl. See also under *Chlorocyphella* (p. 40).

muscigenus. — *Leptotus muscigenus* (Bull. per Fr.) Maire, *Arrhenia muscigena* (Bull. per Fr.) R. Heim, Champ. Europe **2**: 113. 1957 (incomplete reference), not *Arrhenia muscigena* (Pers. per Mérat) Quél., Fl. mycol. France 33. 1888.

For this species, see under *Leptoglossum* (p. 42).

muscorum. — *Merulius muscorum* Roth *in* Ann. Bot. (ed. Usteri) St. 1: 10 *pl. 1 f. 4.* 1791; Catal. bot. **1**: 238. 1797; (devalidated name). — *Cantharellus muscorum* (Roth) *per* Fr., Syst. mycol. **1**: 325. 1821. — *Merulius muscorum* (Roth per Fr.) Pers., Mycol. europ. **2**: 24. 1825. — *Dictyolus muscorum* (Roth per Fr.) Quél., Ench. Fung. 140. 1886. — *Leptoglossum muscorum* (Roth per Fr.) Velen., České Houby 85. 1920; *in* Mykologia, Praha **2**: 44 *f. 3.* 1925.

An imperfectly known species. The fungus that Sommerfelt named *Merulius muscorum* was referred to *Cyphella galeata* (Schum. per Fr.) Fr. by Fries (*1838:* 568). Velenovský's interpretation is not accessible to me because of the Czech description. The original fungus was described as "gelatinosus" and might be a discomycete; I am unable to make a more precise suggestion.

nigrocaesius. — *Peziza nigrocaesia* Schum., Enum. Pl. Saell. **2**: 435. 1803 (devalidated name). — [*Peziza alboviolascens* var. "β. *P. nigro caesia*" (Schum.) Fr., Syst. mycol. **2**: 96. 1822. —] *Peziza alboviolascens* var. *nigrocaesia* (Schum.) *per* Hornem. *in* Fl. dan. **12** / Fasc. 35: 8 *pl. 2082 f. 2.* 1832.

Fries (l.c.) referred this to *Peziza alboviolascens* A. & S. = *Lachnella alboviolascens* (A. & S. per Pers.) Fr., but neither Schumacher's original description nor his figure published much later by Hornemann support such a disposition. Evidently we are dealing here with some discomycete; the name has not been taken up or listed as a synonym in authoritative modern literature.

papillaris. — *Peziza papillaris* Bull., Herb. France *pl. 467 f. 1.* 1789; Hist. Champ. France **1**: 244. 1791; (devalidated name). — *Peziza papillaris* Bull. *per* Mérat, Nouv. Fl. Paris, 2me Ed., **1**: 22. 1821; S. F. Gray, Nat. Arr. Brit. Pl. **1**: 666. 1821; Fr., Syst. mycol. **2**: 102. 1822. — *Urceolella papillaris* (Bull. per Mérat: Fr.) Boud., Ic. mycol. **4**: 310 & **3**: *pl. 529.*

This was listed by Sprengel (*1827:* 505) as a synonym (variety) of *Peziza villosa* Pers. For a redescription of this inoperculate discomycete, see Boudier (l.c.).

papillatus. — *Porotheleum papillatum* Peck *in* Rep. New York St. Mus. nat. Hist. **40**: 55. 1887 (n.v.).

Lloyd (*1917:* 740) attributed this to *Porotheleum fimbriatum* (Pers. per Fr.) Fr. = *Stromatoscypha fimbriatum* (Pers. per Fr.) Donk as its young papillate condition (whatever that may mean). However, Peck's description (Saccardo, *1888:* 422) contains, ". . . tenuissimum, . . . subceraceum . . ., margine subindeterminato; verrucis minutis, subdistantibus, . . . globulo hyalino umbrino coronatis." Hence it would seem that this is again *Odontia sudans* (A. & S. per Fr.) Bres. = *Dacryobolus sudans* (A. & S. per Fr.) Fr., a species repeatedly confused with *Porotheleum*; see also discussion under *Dacryobolus* Fr. (p. 41). W. B. Cooke (*1957:* 684, 685) indicates that he saw the type and lists Peck's species under *Porotheleum fimbriatum* without explaining why such big discrepancies exist between the original description and the type material. As long as this has not been done, it would seem advisable again to dissociate *P. papillatum* from *P. fimbriatum.*

patens. — *Cyphella patens* A. L. Sm. *in* J. Linn. Soc., Lond. (Bot.) **35**: 10 *pl. 1 fs. 6–8.* 1891.

There are gills present (". . . lamellis paucis angustis lamelliformis instructis . . ."). The spores are given as 'minute asperulis'. The fruit-body is spathulate and laterally produced from a stalk-like base. Apparently an agaric species, but I am unable to make a suggestion regarding the genus.

pendulus. — [*Peziza digitalis* A. & S. *sensu* Schw. *in* Schr. naturf. Ges. Leipz. **1**: 118. 1822. —] *Peziza pendula* Schw. *in* Schr. naturf. Ges. Leipz. **1**: 118. 1822 (nomen provisorium & alternativum); "Schwaegr. in litt.", Fr., Syst. mycol. **2**: 203. 1822 (as a synonym). — *Cyphella pendula* (Schwäger.) *ex* Fr., Syst. mycol. **2**: 203. 1822. — *Polyporus pendulus* Fr., Nov. symb. 49 = *in* Nova Acta Soc. Sci. upsal. III **1**: 65. 1851 ("mscr."; as a synonym); Ellis *in* Amer. Nat. **18**: 721. 1884. — *Porodisculus pendulus* (Fr.) Murrill *in* N. Amer. Fl. **9**: 47. 1907.

Except for the 'disc', which may have been either destroyed or not attentively studied (". . . discum profunde excavatum laevem pallentem cingens"), the original description gives a sufficiently clear picture of the species that has been called *Sphaeria pocula* Torrey ex Fr. — *Polyporus pocula* (Torrey ex Fr.) Berk. & C. and the correct name of which would appear to be *Porodisculus pendulus* (Fr.) Murrill (Polyporaceae).

pteridophilus. — For *Cyphella pteridophila* Sacc., see *Cyphella fili(ci)cola* Cooke.

pteridophyta. — See '*pteridophilus*'.

pruinatus. — *Peziza amorpha* var. (β.) *pruinata* A. & S., Consp. Fung. nisk. 329. 1805 (devalidated name).

Fries (*1828:* 184) thought this variety to be a form of *Thelephora flocculenta* Fr., which in my opinion (see above) is in its turn a mere form of *Corticium evolvens* (Fr. per F.) Fr. The original description is sufficiently detailed for us to reject this identification, but I am unable to suggest an alternative, although I would exclude it in any case from the 'Cyphellaceae' as currently understood.

pulcher. — *Cyphella pulchra* Berk. & Br. *in* J. Linn. Soc., Lond. (Bot.) **14**: 74. 1873. — *Chaetocypha pulchra* (Berk. & Br.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — *Marasmius pulcher* (Berk. & Br.) Petch *in* Ann. R. bot. Gdns Peradeniya **9**: 21. 1924.

Referred to, and redescribed as a species of, *Marasmius* Fr. by Dennis & Reid (*1957:* 290 *fs. 4–6*).

pulveraceus. — *Peziza pulveracea* A. & S., Consp. Fung. nisk. 342 *pl. 8 f. 2.* 1805 (devalidated name). — *Peziza pulveracea* A. & S. *per* Pers., Mycol. europ. **1**: 267, 327. 1822; Schw. *in* Schr. naturf. Ges. Leipz. **1**: 122. 1822. — *Cenangium pulveraceum* (A. & S. per Pers.) Fr., Syst. mycol. **2**: 181. 1822. — *Cyphella pulveracea* (A. & S. per Pers.) Tul., Sel. Fung. Carp. **3**: 207 (Ind.). 1865 (& cf. p. 173). — *Dasyscypha pulveracea* (A. & S. per Pers.: Fr.) Höhn. *in* S.B. Akad. Wien (Math.-nat.

Kl., Abt. I) **126**: 339. 1917; Dennis, Rev. Brit. Hyalosc. (*in* Mycol. Pap. C.M.I. **32**:) 57 *f. 58.* 1949.

This species was referred to *Cyphella* by the Tulasne brothers (op. cit., p. 173/159): ". . . *Peziza pulveracea* Alb. & Schw. . . . is by no means an ascomycete, but a hymenomycete and a true *Cyphella*, as we have determined after examining the specimens met with in the Ardennes by Montagne, and now contained in Desmazières' herbarium, and also the exactly similar specimens which the master of Lille himself published in his Fl. Crypt. France, ed. 1, fasc. XIII, 1833, no. 605 (under the name *Peziza*)."—Grove's translation.

However, modern mycology thinks that the original fungus is a discomycete most recently described by Dennis (l.c.). von Höhnel (op. cit. p. 338) studied Desmazières 's distribution cited by the Tulasnes and found it to represent a discomycete which he identified with *Peziza pulveracea* A. & S.

r i c k e n i i. — *Leptotus rickenii* Sing. *in* Lilloa **22**: 734. "1949" [1951] (nomen nudum). For this species, see under *Leptoglossum* (p. 42).

r o s e o r u b e r. — *Thelephora cruenta* var. *roseorubra* A. & S., Consp. Fung. nisk. 277. 1805 (devalidated name). — *Thelephora cruenta* var. *roseorubra* A. & S. *per* Pers., Mycol. europ. **1**: 140. 1822.

See under '*sarcoides*'.

r u g o s u s. — *Porotheleum rugosum* Berk. *in* Hook. J. Bot. **8**: 237 *pl. 9 f. 2.* 1856.

According to Lloyd (*1917:* 740) the species Berkeley described as "*Porothelium rugosum* and *Porothelium variabile* [originally described as *Polyporus variabilis* Berk.!] from Brazil are *Polyporus* with pustular pore mouths, closer to *Polyporus lucidus* than to *Porothelium.*" Similar or identical conclusions had previously been published. Patouillard (*1894:* 75) transferred both species to *Ganoderma* P. Karst. (giving *Porotheleum rugosum* the new name *Ganoderma sprucei* Pat. because the combination *Ganoderma rugosum* already existed), while Wakefield (*1934:* 243) referred *Polyporus variabile* to *Amauroderma* Murrill. Recently W. B. Cooke (*1957:* 686) has retained *Porotheleum rugosum* as a true *Porotheleum* (subgen. *Porotheleum!*); he indicates that he has seen [a portion of] the type and describes the spores as "hyaline to yellow, globose, apiculate, minutely verrucose, 7–10.5 μ diameter", and the fructifications as "pileate, sessile, . . . surface with a crust . . .." If he had taken the trouble to look up the original publication, which he cites, he would have found the description and figure of a laterally stalked polypore with a stem as much as 6.5 cm long and a cap about 7.8 cm across. Hardly a typical *Stromatoscypha* one would conclude.

r u g u l o s u s. — *Phlebophora rugulosa* Lév. *apud* Zoll., Syst. Verz. ind. Archipel 12, 17. 1854. — *Cyphella rugulosa* (Lév. apud Zoll.) Sacc., Syll. Fung. **6**: 685. 1888. — *Van-Romburghia rugulosa* (Lév. apud Zoll.) Boedijn *in* Sydowia **5**: 214. 1951.

A common species around Tjibodas and elsewhere in West Java (Indonesia) with centrally and ventrally stalked cap; it drifted into the genus *Cyphella* through

a complete misunderstanding of its characters. It belongs to *Van-Romburghia* Holterm., a remarkable agaric genus with smooth or somewhat veined hymenophore. For a description of the species, see Boedijn (l.c.).

sanguineus. — For *Thelephora cruenta* var. *sanguinea* A. & S., see under *Thelephora cruenta.*

sarcoides. — *Thelephora sarcoides* Fr., Elench. **1**: 185. 1828. — *Corticium sarcoides* (Fr.) Fr., Epicr. 558. 1838. — *Terana sarcoides* (Fr.) O.K., Rev. Gen. Pl. **2**: 872. 1891 ("*sarcodes*"). — *Lomatina sarcoides* (Fr.) Höhn. & L. *in* Ann. mycol., Berl. **4**: 294. 1906. — *Cytidia sarcoides* (Fr.) Herter *in* KryptFl. Brandenb. **6**: 84. 1910; W. B. Cooke *in* Mycologia **43**: 204. 1951, misapplied.

Misapplication.—*Thelephora cruenta* Pers. per Fr. *sensu* Fr., Syst. mycol. **1**: 444. 1821.

Type.—Sweden, Femsjö (hb. Fr.-UPS).

Corticium sarcoides had dropped out of circulation when W. B. Cooke (*1951:* 204) revived it in an application for which he does not present any foundation. The elaborate original account points in the direction of *Corticium evolvens* (Fr. per Fr.) Fr. = *C. laeve* (Pers. per Fr.) Fr. In this connection attention may be drawn to Fries's closing remark, "Varietas tota effusa resupinata subimmarginata difficilius agnoscitur, sed certe huc pertinet." In Uppsala there are two collections of which one ("*Corticium sarcoides* Fr. ' Femsjö") is considered type and one was communicated by Blytt; both were studied by Bresadola. According to Egeland (*1912:* 374) there are also a number of specimens in the herbarium at Oslo named *Corticium sarcoides* by Fries; 'most of the specimens (if not all)' belong to *Corticium evolvens.* This conclusion agrees with Bresadola's about the specimens at Uppsala. All in all there is sufficient evidence to dispose of *Corticium sarcoides* as a synonym of *Corticium evolvens.* It is in any case extremely improbable that it would be a species of *Cytidia* in the sense used by Cooke, or the species he describes under the name of *Cytidia sarcoides.*

Fide Fries (*1828:* 185) *Thelephora cruenta* var. *roseo-rubra* A. & S. ("var. β. A. S. p. 277.") is *Thelephora sarcoides*; this may or may not be correct.

stellatus. — *Fimbrillaria stellata* Sow., Col. Figs Engl. Fungi *pl. 387 f. 1.* 1803 (devalidated name).

Fries (*1838:* 503) referred this fungus to *Porotheleum fimbriatum* (Pers. per Fr.) Fr. = *Stromatoscypha fimbriatum* (Pers. per Fr.) Donk, as a primordial, sterile state, that is, as a state in which the stroma has not yet developed any cups. No doubt Sowerby described some sterile mycelium, but hardly of the present species. I have never seen a specimen of *Stromatoscypha fimbriatum* of the size depicted by Sowerby that had remained completely devoid of cups.

stevensoni. — *Porotheleum stevensoni* Berk. & Br. *in* Ann. Mag. nat. Hist. V **1**: 23. 1878; Stevenson, Brit. Fungi **2**: 231 *f. 71.* 1886.

The original description and the more extensive account by Stevenson (l.c.)

apply well to *Odontia sudans* (A. & S. per Fr.) Bres. = *Dacryobolus sudans* (A. & S. per Fr.) Fr., and Lloyd (*1917:* 741), Wakefield (*apud* Rea, *1922:* 645), and Reid (*1957:* 134) have referred this fungus to that species. See also under *Dacryobolus* Fr. (p. 41).

subceraceus. — *Cyphella subceracea* P. Henn. *in* Hedwigia **36**: 194. 1897; Höhn. *in* Denkschr. math.-nat. Kl. Akad. Wiss. Wien **83**: 6. 1907.

von Höhnel (l.c.) assumed that Hennings had described the spores erroneously as subglobose, 3–4 μ and he redescribed the species on examination of additional material. He concluded that the species evidently formed a link with "*Laschia*". A portion of the type collection (Ule 570, BRSL) which yielded no spores represents the genus *Favolaschia* (see p. 42). It seems to come close to (but is not identical with) *Favolaschia saccharina* Pat. and some other species, like *F. varariotecta* Sing. and *F. singeriana* Dennis (for descriptions, see Singer, *1945:* 203, and Dennis, *1952:* 328). The name **Favolaschia subceracea** (P. Henn.) Donk, *comb. nov.* is proposed. A few microscopical notes on the type follow:

Externally, the fruit-body bears two elements: (i) appressed, elongate, coloured bodies apparently the hardened, often broken, and corrugated contents of gloeocystidia, —250 × 9.5–14 μ, which cause a minute, spaced striolation on the outside; and (ii) variable cells, ovoid, ellipsoid, pear-shaped, clavate, and the like, perpendicular to the surface, wholly covered by short, hair-like projections, about 12–46(–65) × 9–14 μ, and especially copious and crowded on young fruit-bodies.[16] Hymenium not yielding spore-producing basidia, containing gloeocystidia which are very variable in shape, enclosed or protruding, often present in large numbers. Spores not observed.

subcyaneus. — *Cyphella subcyanea* Ell. & Ev. *in* J. Mycol. **2**: 37. 1886.

Farlow (*apud* Burt, *1914:* 381) identified this with *Heterothecium augustinii* Tuckerm. (Lichenes). Fide Santesson (*1952:* 50, 537) = *Pyrenotrichum splitgerberi* Mont. See also under *Chlorocyphella* (p. 40).

subtilis. — *Boletus subtilis* Schrad., Spic. Fl. germ. 173 *pl. 3 f. 2.* 1794 (devalidated name). — *Polyporus subtilis* (Schrad.) Fr., Obs. mycol. **1**: 129. 1815 (devalidated name). — *Polyporus* (*Porotheleum*) *subtilis* (Schrad.) *per* Fr., Syst. mycol. **1**: 506. 1821. — *Porotheleum subtile* (Schrad. per Fr.) Fr., Syst. mycol. **3** (Ind.): 150. 1832; Epicr. 504. 1838. — *Poria subtilis* (Schrad. per Fr.) Bres. *in* Atti Accad. Agiati III **3**: 88. 1897.

Fries (ll.cc.) referred this species to *Porotheleum*, but there is little in Schrader's original account to support this interpretation. Bresadola (l.c.) identified it with the species that is now often known as *Poria candidissima* (Schw.) Cooke = *Cristella candidissima* (Schw.) Donk apud W. B. Cooke, which is a far more likely disposition.

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[16] Singer calls similar cells 'dendrophyses' (cf. *1945: text-pl. 3 f. 9*) which is somewhat confusing.

subtropicus. — For *Chlorocyphella subtropica* Speg., see under *Chlorocyphella* Speg. (p. 40).

sulphureus. — *Peziza sulphurea* Batsch, El. Fung. 121. 1783; Cont. 1: 209 *pl. 27 f. 146.* 1786; (devalidated name); not *P. sulphurea* Pers. *in* Neues Mag. Bot. **1**: 113. 1794 (= Tent. 33. 1797) (devalidated name) *per* S. F. Gray, Nat. Arr. Brit. Pl. **1**: 665. 1821 & Fr., Syst. mycol. **2**: 104. 1822. — *Cyphella sulphurea* (Batsch) *per* Fr., Hym. europ. 665. 1874. — *Chaetocypha sulphurea* (Batsch per Fr.) O.K., Rev. Gen. Pl. **2**: 848. 1891 ("*sulfurea*"). — *Calyptella sulphurea* (Batsch per Fr.) Big. & Guill., Fl. Champ. France, Compl. 479. 1913 ("*sulfurea*").

Peziza sulphurea Batsch was based on a single fruit-body depicted by its author. The figures, showing a disk-shaped (rather than a bell-shaped) cup on a relatively long stalk which becomes wider towards the cup, are reminiscent not of a species of *Calyptella*, but rather of some kind of discomycete. Dr. J. A. Nannfeldt kindly stated as his opinion (personal communication) that, "*Peziza sulphurea* Batsch n. CXLVI) is clearly an inoperculate discomycete, perhaps *Helotium* ex aff. *herbarum* or *Belonioscypha Campanula.*"

When Fries (l.c.) restored Batsch's name as *Cyphella sulphurea*, he used it as the correct name for what he had previously called *Peziza campanula* C. Nees, reducing the latter name to a synonym. Nees's species has been variously interpreted, usually as a species of *Belonioscypha* Rehm, an inoperculate discomycette, but also as a species referable to *Calyptella*; see page 48. Later authors have applied the name *Cyphella sulphurea* to yellow forms of, or resembling, *Calyptella capula* (Holmskj. per Pers.) Quél., thus to forms that more closely agree with Nees's figure than with Batsch's. The uses of Batsch's name for them are evidently misapplications, and the various forms called *Cyphella sulphurea* will have to be treated in a different way. A discussion on this subject is reserved for a further occasion.

tenellus. — *Merulius tenellus* DC., Fl. franç. **2**: 132. 1805 (devalidated name). — *Cantharellus tenellus* (DC.) *per* Fr., Syst. mycol. **1**: 325. 1821. — *Merulius tenellus* (DC. per Fr.) Pers., Mycol. europ. **2**: 25. 1825. — *Arrhenia tenella* (DC. per Fr.) Fr., Summa Veg. Scand. **2**: 312. 1849. — *Leptotus tenellus* (DC. per Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **32**: 242. 1879. — *Dictyolus tenellus* (DC. per Fr.) Pat., Essai taxon. Hym. 131. 1900.

This species has dropped out from modern floras and monographs. Several features indicated in the original description, like ". . . consistance . . . fragile, un peu gélatineuse; . . . couleur noire en dessus, et un peu moins obscure en dessous; . . . diamètre . . . d'un centimètre environ; . . . marqué en dessous de veins proéminentes inégales, qui rayonnent du centre . . . sur les vieilles planches pourries . . .", strongly suggest some species of *Resupinatus* (C. Nees) per S. F. Gray, and I would exclude it from the 'Cyphellaceae' in any case as being evidently agaric. It would seem that Fries (*1828:* 56) reached a somewhat similar conclusion, "[*Cantharellus tenellus*] et *C. cupularis* sunt potius *Agarici macilenti*, ab *A*[*garico*] *striatulo* haud longe distantes."

tremulus. — *Leptotus tremulus* (Schaeff. per Fr.) Sing. *in* Lilloa **22**: 735. "1949" [1951]. For this species, see under *Leptoglossum* (p. 42).

tunicatus. — *Boletus tunicatus* Schum., Enum. Fl. Saell. **2**: 391. 1803 (devalidated name).

This was incorrectly referred by Secretan (*1833*: 164) to *Polyporus fimbriatus supinus* Secr. = *Porotheleum fimbriatum* (Pers. per Fr.) Fr. = *Stromatoscypha fimbriatum* (Pers. per Fr.) Donk. As far as can be judged from the too short original description this is a species of *Poria* Pers. per S. F. Gray *sensu lato*, but it is difficult to be more precise. Fries (*1821*: 381) referred the fungus to *Polyporus vulgaris*.

umbonatus. — For "*H*[*elotium*] *umbonatum* A. S.", see under *Peziza gibba* A. & S.

urceolatus. — *Peziza urceolata* Vahl *in* Fl. dan. **6** / Fasc. 17: 10 *pl. 1017 f. 3*. 1790 (devalidated name); not *P. urceolata* "Rutstr. diss. p. 19." (devalidated name). — *Peziza urceolata* Vahl *per* Pers., Mycol. europ. **1**: 316. 1822; Schw. *in* Schr. naturf. Ges. Leipz. **1**: 124. 1822; Fr., Syst. mycol. **2**: 148, 201. 1822 (sp. inquir.). — *Solenia urceolata* (Vahl per Pers.) Wallr. *apud* Fr., Elench. **2**: 28. 1828. — *Henningsomyces urceolatus* (Vahl per Pers.: Fr.) O.K., Rev. Gen. Pl. **3** (2): 483. 1898. — *Solenia poriaeformis* var. *urceolatus* (Vahl per Pers.: Fr.) Pilát *in* Ann. mycol., Berl. **23**: 168 *f. 19: 5–7*. 1925. — *Cyphella urceolata* (Vahl per Pers.: Fr.) Bourd. & G., Hym. France 162. "1927" [1928].

The original description (accompanying a figure) merely runs, "sessilis, urceolata cinerea, extus pilosiuscula"; the habitat is stated to be "In segmentis ligneis, putridis." The whole account, inclusive of the figure, is in my opinion insufficient to settle the identity of the fungus that Vahl described.

As interpreted by Fries on examination of a (preserved) specimen received from Wallroth, the fungus would be a species congeneric with *Solenia poriaeformis* (Pers. per Mérat) Fuck., but differing, *inter alia*, in having its fruit-bodies scattered. Later Wallroth named his fungus *Peziza aleuritica* Wallr. Since I consider *Peziza urceolata* in its original sense as indeterminable, I will take up Wallroth's name for *Solenia urceolatus* sensu Fries.

vaillantii. — *Boletus vaillantii* DC., Fl. franç. **5**: 38. 1815 (devalidated name). — *Polyporus vaillantii* (DC.) *per* Fr., Syst. mycol. **1**: 383. 1821. — *Poria vaillantii* (DC. per Fr.) Cooke *in* Grevillea **14**: 112. 1886. — *Porotheleum vaillantii* (DC. per Fr.) Quél., Ench. Fung. 181. 1886.

The transfer of this species to *Porotheleum* by Quélet (l.c.) is certainly due to an erroneous conception either of the species or of the generic character of *Porotheleum* since the species is undoubtedly a resupinate polypore belonging to the artificial genus *Poria* Pers. per S. F. Gray *sensu lato*.

W. B. Cooke (*1957*: 684) still includes *Porotheleum vaillantii* (DC. per Fr.) Quél. as a synonym of *Porotheleum fimbriatum* (Pers. per Fr.) Fr. = *Stromatoscypha fimbriatum* (Pers. per Fr.) Donk. From Quélet's fuller description (*1888*: 427) I would conclude

that he was describing young fruit-bodies of *Poria vaillantii*: "Membraneux, ténu, translucide . . . et muni de cordonnets rhizomorphes très longs . . . Sur le bois, les briques, la terre." Quélet merely referred the fungus to the wrong genus when he placed it in *Porotheleum*.

v a r i a b i l i s. — For *Chaetocypha variabilis* Corda, see under *Chaetocypha* Corda (p. 40).

v a r i a b i l i s. — *Porotheleum variabile* (Berk.) Lloyd, Mycol. Notes **5**: 740. 1917 (not definitely accepted by publishing author). For this species of polypores, see page 60.

v i l l o s u s. — For *Trabecularia villosa* Bon., see under *Trabecularia* Bon. (p. 45).

4.—THE ALEURODISCOID SPECIES

It is not my intention to discuss *Aleurodiscus* here from another point of view but its cyphelloid members; all resupinate species will be kept out of consideration. To limit the subject still more, attention will be paid only to the type species of *Aleurodiscus* and to those species that are not yet unanimously admitted to the genus.[17] The species I have in mind are:

(i) *Cyphella digitalis* (A. & S.) per Fr., type species of the name *Cyphella*.

(ii) *Cyphella vitellina* (Lév.) Pat., type species of the name *Gloeosoma*.

(iii) *Cytidia hakgallae* (Berk. & Br.) G. W. Mart., type species of the name *Gloeocystis*; it is currently identified with *Cytidia cornea* Lloyd.

(iv) *Cytidia magnispora* (Burt) Welden.

The main issue in connection with these species is, whether *Aleurodiscus* should be broadly conceived or be broken up into a long series of small genera. If one attributes generic significance to variations in shape and in consistency of the fruit-body, the number of genera could be much increased, and if one emphasizes, in addition, the various types of sterile hymenial elements, the multiplication of genera could be made really spectacular. It would seem that in delimitating *Aleurodiscus* other standards ought to be accepted than those employed elsewhere in the resupinate and cyphelloid groups. The solution of this problem cannot be given by taking into account only the above species: full consideration of the whole range of species of *Aleurodiscus* will be necessary, which leads to the confession that the generic limits of *Aleurodiscus* against several resupinate genera have not yet been sufficiently cleared. In short, the solution of the problem has to wait and in the meantime a simple disposition of the above mentioned cyphelloid species is wanted; this, in my opinion, means, inclusion in *Aleurodiscus*.

To me a corticioid or cyphelloid species of hymenomycetes that has enormous, globular spores, with amyloid walls is a good species of *Aleurodiscus*. This provides

[17] Two other species originally described as belonging to *Cyphella* but now referred to *Aleurodiscus* will be mentioned at the end of this chapter.

for the transfer of species (ii). The case of (i) and (iii) is less clear: they have the enormous spores and some other sporal characters required for a typical species of *Aleurodiscus*, but on the other hand the spore wall is not amyloid and, moreover, notable sterile elements between the basidia are absent in (i). Yet basidia and spores are so clearly 'aleurodiscoid' that I have decided to include them with the other species. It may be remembered that also among the non-cyphelloid species of *Aleurodiscus* one or two species with non-amyloid spores are included.

If one accepts the conclusion that the type species of *Cyphella* (*C. digitalis*) is so closely related to the type species of *Aleurodiscus* that they are congeneric, then it should be remembered that it has been decided to conserve *Aleurodiscus* against *Cyphella*.

ALEURODISCUS Rab. ex J. Schroet.[18, 19]

Cyphella Fr., Syst. mycol. **2**: 201. 1822; Steud., Nomencl. bot. Pl. crypt. 142. 1824 ("*Cypella*"); nomen rejiciendum versus *Aleurodiscus* Rab. ex J. Schroet. — *Cyphella* sect. *Cyphella* (Fr.) Pat., Essai taxon. Hym. 56. 1900. — Lectotype (Code 1956: 209): *Cyphella digitalis* (A. & S.) per Fr. — Cf. Donk, *1951:* 210.

Nodularia Peck *in* Rep. New York St. Mus. nat. Hist. **24**: 96. 1872; not *Nodularia* Link ex Lyngbye (1819; Lemanaceae, Rhodophyceae); not *Nodularia* Mert. apud Jürg. ex Bornet & Flah. (1888; 'Nostocaceae Heterocysteae', Cyanophyceae; nom. cons., see Code 1956: 199). — Monotype: *Nodularia balsamicola* Peck.

Aleurodiscus Rab., Fungi europ. exs. No. 1824 *fig.* 1874 & *in* Hedwigia **13**: 184. 1874 (nomen nudum); Cooke *in* Grevillea **3**: 136. 1875 (nomen nudum). — *Aleurodiscus* Rabenh. *ex* J. Schroet. *in* Krypt.-Fl. Schles. **3** (1): 429. 1888; nomen conservandum versus *Cyphella* Fr.[18]

Matula Mass. *in* J. R. microsc. Soc. II **8**: 176. 1888 (nomen anamorphosis). — *Cytidia* sect. *Matula* (Mass.) W. B. Cooke *in* Mycologia **43**: 208. 1951. — Monotype: "*Artocreas*" *poroniaeformis* Berk. & Br. [= imperfect state of *Aleurodiscus hakgallae* (Berk & Br.) Donk].

Cypharium Clem. *in* Univ. Stud. Nebraska **3** (1): 72. 1902 (nomen nudum) ≡ *Cyphella* Fr.

Gloeosoma Bres. *in* Ann. mycol., Berl. **18**: 51. 1920. — Monotype: *Aleurodiscus vitellinus* (Lév.) Pat.

Aleurodiscus subgen. *Pseudophysium* Pilát *in* Ann. mycol., Berl. **24**: 207, 208. 1926. — Lectotype: *Aleurodiscus amorphus* (Pers. per Purt.: Fr.) J. Schroet.

Aleurodiscus sect. *Disciopsis* Pilát *in* Ann. mycol., Berl. **24**: 211. 1926. — Monotype: *Aleurodiscus amorphus* (Pers. per Purt.: Fr.) J. Schroet.

Cyphella [sect.] *Coloratae* Killerm. *in* Nat. PflFam., 2. Ausg., **6**: 150. 1928. — Lectotype: *Cyphella digitalis* (A. & S. per Pers.) Fr.

Aleurodiscus sect. *Eualeurodiscus* T. Ito *in* Bot. Mag., Tokyo **43**: 460. 1929. — Lectotype: *Aleurodiscus amorphus* (Pers. per Purt.: Fr.) J. Schroet.

Aleurocystus [!] "McGinty": Lloyd, Mycol. Writ. **6**: 1088. 1921 (nomen provisorium). — *Aleurocystis* Lloyd *ex* G. Cunn. *in* Trans. roy. Soc. New Zeal. **84**: 234. 1956. — Monotype: [*Aleurodiscus capensis* Lloyd =] *Aleurodiscus corneus* (Lloyd) Lloyd.

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[18] The Code (1956: 209) credits "Cooke, Grevillea **3**: 136. 1875" with the valid publication of this name which is an error still to be corrected (cf. Donk, *1951:* 206). Other uses of the generic name *Aleurodiscus* between Cooke's first use and Schroeter's are by Cooke (*1875*: 172) and Saccardo, Mycoth. veneta No. 727. 1876 (n.v.; cf. Saccardo, *1877:* 101), in specific combinations, again without an accompanying generic description.

[19] The following synonymy is related only to the type and the cyphelloid species to be discussed below.

DESCRIPTION.—Patouillard, Essai taxon. Hym. 52. 1900.
LECTOTYPE (Code 1956: 209).—*Peziza amorpha* Pers. = *Thelephora amorpha* (Pers. per Purt.) Fr. — Cf. Donk, *1951:* 206.

ALEURODISCUS AMORPHUS (Pers. per Purt.: Fr.) J. Schroet.

Peziza amorpha Pers., Syn. Fung. 657. 1801 (devalidated name). — *Peziza amorpha* Pers. *per* Purt., App. Midl. Fl. 265. 1821; Pers., Mycol. europ. **1**: 269. 1822. — *Thelephora amorpha* (Pers. per Purt.) Fr., Elench. **1**: 183. 1828. — *Corticium amorphum* (Pers. per Purt.: Fr.) Fr., Epicr. 559. 1838. — *Aleurodiscus amorphus* (Pers. per Purt.: Fr.) Rab., Fungi europ. exs. No. 1824 & *in* Hedwigia **13**: 184. 1874 (generic name not validly published). — *Lachnea amorpha* (Pers. per Purt.: Fr.) Gillet, Champ. France, Disc. 89. 1881. — *Aleurodiscus amorphus* (Pers. per Purt.: Fr.) J. Schroet. *in* Krypt.-Fl. Schles. **3** (1): 429. 1888.

Nodularia balsamicola Peck *in* Rep. New York St. Mus. nat. Hist. **24**: 96 *pl. 4 fs. 23–26.* 1872. — Monotype: U.S.A., New York, Indian Lake (Peck; NYS, NY). — Fide Höhn. & Litsch. *in* S.B. Akad. Wien (Math.-nat. Kl., Abt. I) **116**: 799. 1907 & Burt *in* Ann. Missouri bot. Gdn **5**: 180. 1918 = *Aleurodiscus amorphus.*

[*Corticium amorphum* (Pers. per Purt.: Fr.) Fr. *sensu* Richon *in* Bull. Soc. bot. France **24**: 148–149 *fs. 1–6.* 1877. —] *Corticium amorphum* f. *pezizoides* Roum., Fungi sel. exs. No. 4604. 1888 & *in* Rev. mycol. **10**: 185. 1888. — Type locality: presumably France; type: specimen described by Richon, l.c.

Aleurodiscus grantii Lloyd, Mycol. Writ. **6**: 927 *pl. 147 fs. 1668, 1669.* 1920. — Lectotype (Stevenson & Cash *in* Bull. Lloyd Libr. No. 35: 43. 1936): U.S.A., Washington (J. M. Grant 970, hb. Lloyd 39.000-BPI). — Fide D. P. Rog. & Jacks. *in* Farlowia **1**: 269. 1943 = *Aleurodiscus amorphus.*

DESCRIPTIONS & ILLUSTRATIONS.—De Candolle, Fl. franç. **6**: 23. 1815 (*Peziza*); Fries, Elench. **1**: 183. 1828 (*Thelephora*); Richon *in* Bull. Soc. bot. France **24**: 149 *fs. 1 6.* 1877 (*Corticium*); Schroeter *in* Krypt.-Fl. Schles. **3** (1): 429. 1888, Patouillard, Essai taxon. Hym. 53. 1900, von Höhnel & Litschauer *in* S.B. Akad. Wien (Math.-nat. Kl., Abt. I) **116**: 799 *pl. 1 f. 2.* 1907, Burt *in* Ann. Missouri bot. Gdn **5**: 180 *f. 1.* 1918, Lloyd, Mycol. Writ. **6**: 926 *pl. 147 fs. 1666, 1667.* 1920, & Bourdot & Galzin, Hym. France 331. 1928 (all as *Aleurodiscus*).
TYPE.—L 910.267–343.

The specimen indicated above as type (L 910.267–343) is labelled in Persoon's own handwriting, "*Thelephora amorpha* Fries El. 183 / *Peziza* —— Pers. Syn. p. 657." Another specimen in Persoon's herbarium is labelled, "*Peziza amorpha.* Pers. Syn. 657. Natura aut substantia *Theleph.*, forma *Peziz*[*ae*]. / in cortice abietis / *Thelephora amorpha* Fr. El. fung. p. 183", all in Persoon's handwriting except the words "*Peziza* . . . in cortice abietis", which were written by Mougeot. Both specimens represent the fungus now universally associated with the name *Peziza amorpha* and its isonyms. The species was distributed by Mougeot & Nestler, Stirpes Crypt. vogeso-rhenanae, Fasc. 4: No. 398. 1813 as *Peziza amorpha* (n.v.), evidently after Persoon had so named the specimen Mougeot had sent him. Fries got acquainted with the species through material he received from the 'Alps' from Mougeot.

For *Thelephora laxa* Pers., see page 57.

ALEURODISCUS DIGITALIS (A. & S. per Pers.: Fr.) Donk

Peziza digitalis A. & S., Consp. Fung. nisk. 315 *pl. 5 f. 1.* 1805 (devalidated name). — *Peziza digitalis* A. & S. *per* Pers., Mycol. europ. **1**: 280. 1822. — *Cyphella digitalis* (A. & S.

per Pers.) Fr., Syst. mycol. **2**: 201. 1822. — *Solenia digitalis* (A. & S. per Pers.: Fr.) Quél., Ench. Fung. 214. 1886. — *Chaetocypha digitalis* (A. & S. per Pers.: Fr.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — *Aleurodiscus digitalis* (A. & S. per Pers.: Fr.) Donk *in* Reinwardtia **1**: 210. 1951.

DESCRIPTIONS & ILLUSTRATIONS.—Secretan, Mycogr. suisse **3**: 632. 1833; Patouillard, Tab. anal. Fung. **1**: 18 *f. 29.* 1883; Haller *in* Schweiz. Z. Pilzk. **29**: 17 (*2*) *fs.* 1951; Pilát *in* Acta Mus. nat. Pragae B **9** (2): 88 *fs. 89–91*; (all as *Cyphella*).

TYPE LOCALITY.—Germany, Oberlausitz.

SOME SPECIMENS EXAMINED.—FRANCE, Vosges (hb. Pers.-L 910.256–1861; small remnants of fruit-bodies only), Bruyères (Moug. & Nestl., Stirp. Crypt. vog.-rhen. No. 585), Corcieux and other localities (Galzin, hb. Bourd. 4733, 4734, 6892, 37.333), two specimens sent by Quélet (hb. Fr.-UPS; not microscopically examined). SWITZERLAND, (Chaillet, hb. Pers.-L 910.261–986, small remnant of a fruit-body only), Corçelles near Neuchâtel (Morthier, P, & distributed in Thüm., Mycoth. univ. No. 515 & Rab. & Wint., Fungi europ. exs. No. 2631).

The alternative disposition to placing this species in *Aleurodiscus* is keeping it apart in a small genus of its own, which would be characterized by its thimble-shaped, short-stalked, membranous and non-gelatinous fruit-body, the big basidia which form a hymenium lacking noticeable sterile elements, and the voluminous, smooth, non-amyloid spores, a combination of features that would differentiate it from *Gloeosoma* (*Aleurodiscus vitellinus*) and *Aleurocystis* (*Aleurodiscus hakgallae*). Both have gelatinous fruit-bodies and characteristic sterile elements between the basidia (lamprocystidia, or 'metuloids', in *Aleurocystis*).

Aleurodiscus magnisporus (Burt) Donk, *comb. nov.*

Stereum magnisporum Burt *in* Ann. Missouri bot. Gdn **7**: 207 *f. 37, pl. 6 f. 65.* 1920. — *Cytidia magnispora* (Burt) Welden *in* Mycologia **50**: 305 *f. 2.* 1958.

DESCRIPTION & ILLUSTRATION.—Welden *in* Mycologia **50**: 305 *f. 2.* 1958 (*Cytidia*).

HOLOTYPE.—Jamaica, Chester Vale (W. A. & E. L. Murrill 328, comm. NY, hb. Burt-FH, hb. Bourd. 31.209).

SPECIMEN EXAMINED.—Portion of type (hb. Bourd., as *Cytidia magnispora*).

Aleurodiscus hakgallae (Berk. & Br.) Donk, *comb. nov.*

Corticium hakgallae Berk. & Br. *in* J. Linn. Soc., Lond. (Bot.) **14**: 72. 1873 ("*hakgallae*"). — *Peniophora hakgallae* (Berk. & Br.) Cooke *in* Grevillea **8**: 20 *pl. 124 f. 10.* 1879 ("*habgallae*"). — *Lloydella hakgallae* (Berk. & Br.) Bres. *apud* Killerm. *in* Nat. PflFam., 2. Ausg., **6**: 145. 1928 ("*habgallae*"). — *Cytidia hakgallae* (Berk. & Br.) G. W. Mart. *in* Lloydia **5**: 160 *fs. 4–12.* 1942 ("*habgallae*"). — "*Cyphella habgallae*" W. B. Cooke *in* Mycologia **43**: 199. 1951 (error). — *Aleurocystis hakgallae* (Berk. & Br.) G. Cunn. *in* Trans. roy. Soc. New Zeal. **84**: 235 *f. 2.* 1956.

"*Artocreas poroniaeformis*" Berk. & Br. *in* J. Linn. Soc., Lond. (Bot.) **14**: 73. 1873 (error for '*Michenera poroniaeformis*'); Sacc., Syll. Fung. **6**: 653. 1888 ("*Michenera poroniaeformis*"); P. Henn. *in* Nat. PflFam. **1** (1**): 120. 1898 ("*M. poroniiformis*"); (nomen anamorphosis). — *Matula poroniaeformis* (Berk. & Br.) Mass. *in* J. R. miscrosc. Soc. II **8**: 176. 1888. — Monotype: Ceylon (Thwaites 309, K). — Fide Petch *in* Trans. Brit. mycol. Soc. **11**: 72, 80. 1926 = *Peniophora hakgallae* (imperfect state).

Michenera rompelii J. Rick *in* Ann. mycol., Berl. **2**: 243. 1904 (nomen anamorphosis). — *Matula rompelii* (J. Rick) Lloyd, Mycol. Writ. **2**: 391. 1908. — Type locality: Brazil, Rio

Grande do Sul, São Leopoldo (J. Rick). — Fide G. W. Mart. *in* Lloydia **5**: 162. 1942 = *Cytidia hakgallae*.

Cytidia cornea Lloyd, Mycol. Writ. **5**: 656 *fs. 935–937*. 1917. — *Aleurodiscus corneus* (Lloyd) Lloyd, Mycol. Writ. **6**: 930 *pl. 148 f. 1688*. 1920. — Monotype: Union of South Africa (A. V. Duthie 154, hb. Lloyd 34.063-BPI). — Fide G. W. Mart. *in* Lloydia **5**: 161. 1942 & Talbot *in* Bothalia **6**: 477. 1956 = *Cytidia hakgallae*.

Aleurodiscus capensis Lloyd, Mycol. Writ. **6**: 930 *pl. 148 f. 1687*. 1920. — *Gloeosoma capensis* (Lloyd) "McGinty": Lloyd, Mycol. Writ. **6**: 1088. 1921 (name not definitely accepted). — *Aleurocystus capensis* (Lloyd) Stevenson & Cash *in* Bull. Lloyd Libr. No. 35: 42. 1936 (name not accepted). — Monotype: Union of South Africa (van der Bijl 833, hb. Lloyd 34.029-BPI). — Fide G. W. Mart. *in* Lloydia **5**: 161. 1942 & Talbot *in* Bothalia **6**: 477. 1956=*Cytidia hakgallae*.

DESCRIPTIONS & ILLUSTRATIONS.—Petch *in* Ann. R. bot. Gdns Peradenyia **9**: 135. 1924 & **9**: 292. 1925, & *in* Trans. Brit. mycol. Soc. **11**: 78 *pls. 2, 3*. 1926 (*Peniophora*); Martin *in* Lloydia **5**: 160 *fs. 4–12*. 1942 (*Cytidia*); W. B. Cooke *in* Mycologia **43**: 208 *fs. 1, 2, 13, 19, 23*. 1951 (*Cytidia*); Talbot *in* Bothalia **6**: 477 *f. 17*. 1956 (*Cytidia*).

TYPE.—Ceylon, Hakgalla ("Habgalla") (Thwaites 339, K).

SPECIMEN EXAMINED.—Type of *Cytidia cornea*, comm. Lloyd 154, hb. Bourd. 18.242.

ALEURODISCUS VITELLINUS (Lév.) Pat.

Exidia vitellina Lév. *in* Ann. Sci. nat. (Bot.) III **2**: 219. 1844. — *Hirneola vitellina* (Lév.) Fr. *in* K. svenska VetAkad. Handl. **69**: 147. 1848. — *Cyphella vitellina* (Lév.) Pat. *in* Bull. Soc. mycol. France **3**: 121 *pl. 10 f. 1*. 1887. — *Auricula vitellina* (Lév.) O.K., Rev. Gen. Pl. **2**: 844. 1891. — *Chaetocypha vitellina* (Lév.) O.K., Rev. Gen. Pl. **2**: 848. 1891. — *Aleurodiscus vitellinus* (Lév.) Pat., Essai taxon. Hym. 54. 1900. — *Gloeosoma vitellinum* (Lév.) Bres. *in* Ann. mycol., Berl. **18**: 51. 1920.

Exidia catillus Mont. *in* C. Gay, Hist. Chile **7** (Bot., Pl. cell.): 392. "1850" [1852]. — *Hirneola catillus* (Mont.) Mont., Syll. 182. 1856. — *Auricula catillus* (Mont.) O.K., Rev. Gen. Pl. **2**: 844. 1891. — Monotype: Chile (PC). — Fide Bres. *in* Ann. mycol., Berl. **18**: 51. 1920 = *Gloeosoma vitellinum*.

DESCRIPTIONS & ILLUSTRATIONS.—Montagne *in* C. Gay, Hist. Chile **7** (Bot., Pl. cell.): 393 *pl. 7 f. 12*. [1852] (*Exidia*); Patouillard *in* Bull. Soc. mycol. France **3**: 121 *pl. 10 f. 1*. 1887 (*Cyphella*); Bresadola *in* Ann. mycol., Berl. **18**: 51. 1920 (*Gloeosoma*).

TYPE.—Chile (C. Gay, PC).

SPECIMENS EXAMINED.—Type; Chile (PC).

CYPHELLA AUSTRALIENSIS Cooke

Cyphella australiensis Cooke *in* Grevillea **20**: 9. 1891.

TYPE (only original specimen).—Australia, Melbourne (S. Berggren 378).

Cunningham (*1953a:* 277) reports that the type is a specimen of an immature *Aleurodiscus*. He gives no further information. Compare also page 108.

ALEURODISCUS ZEALANDICUS (Cooke & Phill. apud Cooke) G. Cunn.

Cyphella zealandica Cooke & Phill. *apud* Cooke *in* Grevillea **8**: 57. 1879; Sacc., Syll. Fung. **6**: 670. 1888 ("*zelandica*"). — *Chaetocypha zealandica* (Cooke & Phill. apud Cooke) O.K., Rev.

Gen. Pl. **2**: 848. 1891 ("*zelandica*"). — *Aleurodiscus zealandicus* (Cooke & Phill. apud Cooke) G. Cunn. *in* Trans. roy. Soc. New Zealand **84**: 254 *f.* 7. 1956.

DESCRIPTION.—Cunningham *in* Trans. roy. Soc. New Zealand **84**: 254 *f.* 7. 1956 (*Aleurodiscus*).

TYPE (only original specimen).—New Zealand, Otago, Winton (S. Berggren 230, K).

5.—CYTIDIA Quél.

[*Thelephora* trib. *Resupinatus* A. *R. spurii* Fr., Syst. mycol. **1**: 441. 1821. — Lectotype (Donk *in* Reinwardtia **1**: 215. 1951): *Thelephora salicina* Fr.]

Stereum [sect.] *Cartilaginae* Fr., Elench. **1**: 169. 1828, on p. 180 as "Subcartilagineae ceraceaeve". — Lectotype (Donk *in* Reinwardtia **1**: 215. 1951): *Thelephora salicina* Fr.

Corticium trib. *Apus* Fr., Epicr. 557. 1838 (not validly published). — Lectotype (Donk *in* Reinwardtia **1**: 215. 1951): *Corticium salicinum* (Fr.) Fr.

Corticium [sect.?] *Marginata* Fr., Monogr. Hym. **2**: 262. 1863 (nomen nudum). — Lectotype: *Corticium salicinum* (Fr.) Fr.

Corticium [sect.?] *Lomatia* Fr., Hym. europ. 646. 1874. — *Lomatia* (Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **48**: 403. 1889; not *Lomatia* R. Br. (1810 Proteaceae; nom. cons.). — Lectotype (Donk *in* Reinwardtia **1**: 215. 1951): *Corticium salicinum* (Fr.) Fr.

Cytidia Quél., Fl. mycol. France 25. 1888. — *Corticium* subgen. *Cytidia* (Quél.) Sacc. *in* Fl. ital. crypt., Hym. 1163. 1916.

Lomatina P. Karst. *in* Hedwigia **31**: 220. 1892. — *Cytidia* sect. *Lomatina* (P. Karst.) W. B. Cooke *in* Mycologia **43**: 202. 1951 ≡ *Lomatia* (Fr.) P. Karst. ≡ *Corticium* sect. *Lomatia* Fr.

Fruit-body cup-shaped at first, becoming expanded and more or less appressed to substratum with margin upturned when dry, often becoming irregular in outline, often confluent, rather large (–15 mm in diameter); outside somewhat silky, becoming naked; inside blood-red, with low blunt warts towards centre, drying somewhat wrinkled; substance rather thick-membranous, tough-gelatinous, monomitic. Hyphae with strongly gelatinized wall; clamp-connections present. Basidial region (hyphidial hymenium) consisting of simple or branched hyphal terminations and basidia; the latter originating deep in this region, at first vesicular, than considerably elongating, finally projecting, long-clavate, flexuous, relatively slender; sterigmata 2–4, strongly curved. Spores cylindrical, curved, rather long (10–18 μ), colourless, with smooth, non-amyloid wall (in the type species).

On branches. Temperate Europe and North America.

MONOTYPE.—*Cytidia* "*rutilans* Pers. litt. ad Mougeot" ex Quél. = *Corticium salicinum* (Fr.) Fr. = *Cytidia salicina* (Fr.) Burt.

EXAMPLES.—Personally I know one species (*C. salicina*) that belongs here. Other species that seem to answer the above generic description are *Cytidia patelliformis* (Burt) Welden *in* Mycologia **50**: 304 *f.* 1. 1958 and, perhaps, *Cytidia sarcoides* (Fr.) Herter sensu W. B. Cooke (spores ovoid) and *Cytidia stereoides* W. B. Cooke (spores cylindric, 18–22 μ long).

Cytidia is among the finest examples of genera with a hyphidial hymenium (cf. Donk, *1957b*: 4), viz. with a hymenial region composed of sterile, more of less modified hyphal elements (hyphidia) and basidia of deep origin. The hyphidia are in this case more or less branched and may perhaps be termed dendrohyphidia. The basidia-initials develop in the deeper portions of the hymenial region and have to elongate considerably to reach, and project beyond, the surface and to produce their spores.

This situation clearly distinguishes *Cytidia* from *Auriculariopsis* Maire (p. 76). It also suggests that the genus may be related with other genera characterized by hyphidial hymenia, or in which such hymenia may be encountered, like *Vuilleminia* Maire (fruit-body strictly resupinate) and *Aleurodiscus*. I can see no reason widely to separate *Cytidia* from these two genera and believe that it should tentatively be classed with these at least in the same family, viz. Corticiaceae.

W. B. Cooke's generic description (*1951:* 201) of *Cytidia* runs: —

"Receptacles coriaceous to fleshy-gelatinous, cup-shaped, sessile, attached at a central point, scattered or crowded, often confluent; hymenium even at first, becoming somewhat wrinkled or veined in some cases; basidia simple; spores hyaline to yellowish, amyloid in Melzer's reagent."

This definition invites some comments. First, in most species referred here by Cooke, the fresh or re-soaked fruit-bodies are disk-shaped, flat, completely appressed to the substratum (rather then cup-shaped): it is often only after drying that they become more or less disk- to cup-shaped. Secondly, the introduction of the word 'coriaceous' is a deviation from the current conception: compare Bourdot & Galzin (*1928:* 145), "charnus céracés subgelatineux". In an artificial genus like Cooke's *Cytidia*, not insisting upon 'fleshy-gelatinous' would open the door for many other species. In fact, one wonders why Cooke has not entered the species with more cr less cupulate fruit-bodies that are still retained in *Corticium* Fr. Thirdly, the spores are amyloid perhaps in only one or two species of Cooke's conception; for instance *Corticium hakgallae* and such European species as *Cytidia salicina* and *Cyphella ampla* positively have non-amyloid spores! Finally, there is nothing in Cooke's diagnosis that would exclude the disk- or cup-shaped species of *Aleurodiscus*; in fact, it fits those species well. Under these circumstances it is not surprising that Cooke lists *Gloeosoma* as a synonym of *Cytidia*, however, without any mention of its only species, which is close to, if not congeneric with, *Aleurodiscus*.

To get a more natural genus than Cooke's it will be necessary to exclude such taxa as are obviously aleurodiscoid, like *Gloeosoma*, and *Corticium hakgallae* and *Stereum magnisporum* Burt. These species have big to exceptionally big basidia (very broad in their apical portion) and voluminous, often amyloid spores and, hence, are considered to belong to *Aleurodiscus* in this paper (p. 66). Moreover, all species with euhymenia (superficial basidia-initials) should apparently also be removed: see *Auriculariopsis* (p. 76). This does not mean that *Cytidia* would become a homogeneous group; further studies will have to decide in this matter.

All and all together, with my actual knowledge of this group only a few t y p i c a l species remain; of these I have studied only *Cytidia salicina*.

HISTORICAL.—A small series of species has been bothering mycologists for a long time as to the systematic position of its members: are these to be assigned to *Corticium* Fr. and related genera or are they to be placed near *Cyphella* (originally *Peziza* L.), or in current terms, are they Corticiaceae or Cyphellaceae?

The group I have in mind is the one Fries (*1821:* 441) first called *Thelephora* trib.

Resupinatus A. *R[esupinati] spurii* group * (that is, species 1–3). Its contents: *Thelephora evolvens* Fr. per Fr., *T. salicina* Fr., *T. quercina* Pers. per Fr. Some years afterwards (Fries, *1828:* 169, 180) the group was called *Thelephora* trib. *Apus C. Auricularia* †† *Cartilagineae* ("Subcartilagineae ceraceaeve" on page 180) group * Ceraceae, molles, extus villosae pallidiores. Notable additions to the contents: *Peziza amorpha* Pers. (included with misgivings), *Thelephora flocculenta* Fr., *T. sarcoides* Fr. Still later the group reappears as *Corticium* trib. *Apus* ** E cupulari expansa (Fries, *1838:* 558), which Fries eventually called *Corticium* I. *Lomatia* Fr. It finally included (Fries, *1874:* 646; European species only), in the order given, the following species:

(i) *Corticium evolvens* (Fr. per Fr.) Fr., a species which had evolved from "junior subrotunda clausa, dein evolvens subcupulaeformis" (Fries, *1815:* 154) to "resupinatum, marginatum l. effuso-reflexum" (Fries, *1874:* 646). This name Fries reserved for the not completely resupinate specimens of the fungus that is now often called *Corticium evolvens*, or *Corticium laeve* (Pers. per Fr.) Fr. (as described by Bourdot & Galzin, *1928:* 183).

(ii) *Corticium boltonii* Fr., which will not be taken into further consideration here.

(iii) *Corticium salicinum* (Fr.) Fr., a well-known species which has also been called *Cytidia rutilans* (Pers.) ex Quél.

(iv) *Corticium sarcoides* (Fr.) Fr., which is separately discussed at some length elsewhere in this paper (p. 61).

(v) *Corticium flocculentum* (Fr.) Fr. This species has also been completely misunderstood: it seems referable to *Corticium evolvens* (see p. 53), rather than to *Cyphella ampla*.

(vi) *Corticium versiforme* (Fr.) Fr. This species has never been referred to the 'Cyphellaceae'.

(vii) *Corticium amorphum* (Pers. per Purt.) Fr. This is the well-known species that currently is called *Aleurodiscus amorphus* (Pers. per Purt.) J. Schroet. (see p. 67).

(viii) *Corticium juniperinum* (Weinm. ex Fr.) Fr. This species has never been included in the 'Cyphellaceae'.

(ix) *Corticium populinum* (Sommerf.) Fr. This is according to Bresadola (*apud* Egeland, *1912:* 374) again *Corticium laeve* "Pers. non Fr." (= *Corticium evolvens*. It has never been referred to the 'Cyphellaceae'.

Corticium I. *Lomatia* was subsequently raised to generic rank by Karsten (l.c., 1889) as *Lomatia* (Fr.) P. Karst. of which he described only one Finnish species, viz. *Corticium salicinum*. It soon appeared that the name was preoccupied and it was changed into *Lomatina* P. Karst. As type species of *Lomatia* and its isonym *Lomatina*, as well as of the string of names preceding these two and mentioned above, Donk (*1951:* 215) selected *Corticium salicinum*.

From the above survey it appears that Fries included in *Corticium* I. *Lomatia* two species that have been referred to the 'Cyphellaceae' by a number of authors, viz. *Corticium salicinum* and *C. amorphum*. The first is type species of *Lomatia* = *Lomatina*, the second, of *Aleurodiscus*.

In the meantime Quélet (*1888:* 25) had based a genus *Cytidia* Quél. on *Cytidia*

"*rutilans* Pers. litt. ad Moug.", a name he took up to replace *Corticium salicinum* (which he cited as a synonym). His generic description includes "Spore sphérique", and his specific one, "Spore sphérique (0mm008)", which, if correct, would make *Cytidia rutilans* a quite different species from *Corticium salicinum*. No doubt he committed an error: the indication, 'spores cylindrical, curved, 12–18 μ long' would have been correct. It is now currently agreed upon that *Cytidia* (1888) is an earlier available name for *Lomatina* (1892).

Cytidia has been taken up for a genus of gradually increasing contents. When von Höhnel & Litschauer (*1908:* 57, 61) added to the genus *Corticium flocculentum* (Fr.) Fr. (as conceived by them, that is, as identical with *Cyphella ampla* Lév.) it became heterogeneous. Later additions did not improve this situation.

Fries's conception of the group he would afterwards call '*Lomatia*' (*1849:* 336) shows that he did not consider it related to *Cyphella:* "Ab [*Cyphella*] clare differunt *Corticia* cupularia, hymenio ceraceo nec definite terram spectante." Patouillard (*1900:* 54) was of a different opinion; he included *Cytidia* in his "Cyphellés". He was followed, for instance by Pilát (*1925c:* 64). On the other hand, Killermann (*1928:* 142) referred the genus to the Thelephoraceae as a genus of the tribus Aleurodisceae.

CYTIDIA SALICINA (Fr.) Burt

Thelephora salicina Fr., Syst. mycol. **1**: 442. 1821; not *Thelephora salicina* Pers., Mycol. europ. **1**: 132. 1822. — *Corticium salicinum* (Fr.) Fr., Epicr. 558. 1838. — *Auricularia salicina* (Fr.) Quél., Ench. Fung. 208. 1886. — *Lomatia salicina* (Fr.) P. Karst. *in* Hedwigia **28**: 27. 1889; *in* Bidr. Känn. Finl. Nat. Folk **41**: 404. 1889. — *Terana salicina* (Fr.) O.K., Rev. Gen. Pl. **2**: 872. 1891. — *Cytidia salicina* (Fr.) Burt *in* Ann. Missouri bot. Gdn **11**: 10. 1924.

Exidia cinnabarina [Berk. & C.]; Berk. *in* Grevillea **1**: 166. 1873 (as a synonym). — Specimen: U.S.A., New York (Sartwell, hb. M. A. Curt. 3464, UPS). — Fide Berk. *in* Grevillea **1**: 166. 1873 & Berk. & Br. *in* Ann. Mag. nat. Hist. IV **17**: 137. 1876 = *Corticium salicinum.*

[*Thelephora?*] *rutilans* Pers. ("litt. ad Moug."); Quél., Fl. mycol. France 25. 1888 (as a synonym). — *Cytidia rutilans* (Pers.) *ex* Quél., Fl. mycol. France 25. 1888. — Type locality: France, Vosges (leg. J. B. Mougeot).

MISAPPLICATIONS.—*Thelephora cruenta* Pers. *sensu* A. & S., Consp. Fung. nisk. 277. 1805 (var. α. *sanguinea* A. & S.); J. Schroet. *in* Krypt.-Fl. Schles. **3** (1): 423. 1888 (*Corticium*); P. Karst., Finl. Basidsv. 156. 1899 (*Lomatina*); Herter *in* KryptFl. Brandenb. **6**: 83. 1910 (*Cytidia*). — Fide Fr., Elench. **1**: 86. 1828 = *Thelephora salicina.*

Peziza sarcoides (Jacq.) Pers. *sensu* Wahlenb., Fl. lappon. 534. 1812. — Fide Fr., Elench. **1**: 186. 1828 = *Thelephora salicina.*

DESCRIPTIONS & ILLUSTRATIONS.—Karsten, Ic. sel. Hym. Fenn. Fasc. 1: 6 *pl.* (2) *f. 10.* 1885 (*Corticium*); Burt *in* Ann. Missouri bot. Gdn **11**: 10 *pl. 1 f. 8.* 1924 (*Cytidia*); Bourdot & Galzin, Hym. France 145. 1928 (*Cytidia rutilans*); W. B. Cooke *in* Mycologia **43**: 202 *fs. 4, 17, 18, 20, 30.* 1951 (*Cytidia*).

TYPE.—Not known to be in existence.

SPECIMENS EXAMINED.—"*Corticium salicinum* Fr. / Petrop." (UPS, presumably sent by Weinmann, labelled in Fries's own handwriting; cf. Fries, *1828:* 186); also some specimens collected in Sweden, in Fries's own herbarium labelled "*Corticium salicinum* Fr." and apparently approved by him. In Persoon's herbarium is a specimen labelled "*Thelephora salicina* Fr." perhaps in Sommerfeldt's handwriting

(L 910. 267–780). — Further about 80 collections (mainly UPS) from Sweden, Norway, Finland, Canada, and U.S.A.

The identity of *Cytidia rutilans* (Pers.) ex Quél. has already been discussed (p. 72–73).

Exidia cinnabarina Berk. & C. is apparently only a herbarium name given to a collection from the U.S.A. (New York, leg. Sartwell, M. A. Curtis 3464). A portion of it is at Uppsala and was annotated by Fries, "cfr. *Corticium salicinum* Fr." This disposition has been adopted by Berkeley as cited above in the synonymy.

A wide-spread confusion of the species with *Thelephora cruenta* Pers. has occurred. This question will be found discussed in the present paper on page 49, where it is concluded that the type of *Thelephora cruenta* is identical with *Hymenochaete mougeotii* (Fr.) Cooke. *Thelephora cruenta* was first misapplied to the present species by von Albertini & von Schweinitz. They gave the first good description of *Cytidia salicina*, which they identified with *Thelephora cruenta*, typical form ("α. *sanguinea*").

This is rather a 'northern' species in Europe and North America. It is less frequent in Central Europe. No doubt it also occurs throughout Siberia. Most specimens I have seen were collected in the north of Sweden and Norway. Out of the about 80 collections examined only one collection was marked as found on *Alnus* sp., and one on *Populus* sp. In all other cases where the substratum was indicated, this appeared to be various species of *Salix*. W. B. Cooke also reports it from *Prunus serotina*. The species has also been found in New Zealand from where Cunningham (*1956:* 232) reports it from *Populus*, *Salix*, and *Pyrus malus*.

Species of doubtful systematical position

CYPHELLA STICTOIDEA Speg.

Cyphella stictoidea Speg. *in* An. Soc. cient. argentina **17**: 80. 1884.

? *Cytidia wettsteinii* Bres. *apud* Höhn. *in* Denkschr. math.-nat. Kl. Akad. Wiss. Wien **83**: 6. 1907. — *Corticium wettsteinii* (Bres. apud Höhn.) Sacc. & Trott. *in* Sacc., Syll. Fung. **21**: 400. 1912. — Type locality: Brazil, near São Paulo.

DESCRIPTION.—Spegazzini, l.c. (Saccardo, Syll. Fung. **6**: 680. 1888).

Almost mature basidia clavate, 42–60 × 8.5–11 μ; sterigmata not seen. Spores ellipsoid, with a slight tendency to be widest in basal half, somewhat flattened adaxially, colourless, smooth. A few irregular, somewhat club-shaped cells from outside seen; these are thin-walled, granular-incrusted. Context presumably rather gelatinous.

TYPE-DISTRIBUTION.—Paraguay, forest of Caá-guazú (Balansa 3506). Copies examined, PC, K.

The scanty notes given above were taken long ago from the copy at Paris (PC). No completely mature basidia were seen, but the rather broad apical portion of the nearly mature ones would seem to exclude a species of the Dacrymycetaceae. The few basidia as drawn in my manuscript-note also suggest that they formed part of a typical (and not a hyphidial) hymenium.

I suspect that *Cytidia wettsteinii* Bres. is synonymous. It came from southern

Brazil, that is, from an adjacent region, and also grew on bamboo. There seems no basis for referring it to *Cytidia pezizoides* (Pat.) Pat. as was done by W. B. Cooke (*1951:* 207).

CYTIDIA PEZIZOIDES (Pat.) Pat.

Corticium pezizoides Pat. *in* J. Bot. (ed. Morot), Paris **5**: 314. 1891; not *C. pezizoideum* Ell. & Ev. *in* J. Mycol. **4**: 74. 1888 (n.v.); not *C. pezizoideum* (Schw.) Schrenck *in* Bull. Torrey bot. Cl. **21**: 288. 1894. — *Cytidia pezizoides* (Pat.) Pat., Essai taxon. Hym. 54 *f.* 37. 1900. — "*C*[*yphella*] *pezizoides*": W. B. Cooke *in* Mycologia **43**: 199. 1951 (error).

ILLUSTRATION.—Patouillard, l.c., 1891 (*Corticium*) & l.c.. 1900 (*Cytidia*).

Fruit-body –500 (or more) μ thick, round, more or less confluent, 1–4 mm in diam., closely appressed, margin darker (brownish), free, slightly recurved. Hyphae rather distinctly radially-parallel, at one side deflecting towards hymenium, with strongly gelatinous walls. Basidia arranged into a typical hymenium, when young (?) with strongly granular contents and resembling gloeocystidia, 45–60(–68) × 5.5–8.5 μ; sterigmata 2–4, 5–8 μ long. Spores ovoid-subellipsoid, adaxially flattened, colourless, smooth (6–)8–10 × 5–6 μ.

TYPE & SPECIMEN EXAMINED.—Tonkin (Bon 4187, PC, as *Gloeocyphella cinerea* Pat.).

Martin (*1942:* 162 *fs. 13–15*) gives some notes on a rather scanty collection from Panama which he refers here. He also refers here *Cytidia tremellosa* Lloyd, which seems not to be conspecific to me (see below).

This species is very different from the type of *Cytidia* and should be excluded from the genus. If it has to be forced into one of the existing genera it would be better classed as a species of *Auriculariopsis* but I am not disposed to accept a close relationship with the type of that genus either.

CYTIDIA TREMELLOSA Lloyd

Cytidia tremellosa Lloyd, Mycol. Writ. **4**: 516. 1912.

DESCRIPTIONS & ILLUSTRATIONS.—Bourdot *apud* Lloyd, Mycol. Writ. **4**: 516 *f. 513.* 1912; Burt *in* Ann. Missouri bot. Gdn **11**: 12 *pl. 1 f. 9.* 1924.

Context strongly gelatinized. Gloeocystidia-like swollen vesicles, usually pear-shaped, with granular, yellow contents especially noticeable in young portions of fruit-body, perhaps intergrading into basidia. Basidia (50–)58–70 × 8–10 μ; sterigmata 2–4, 5–6.5 μ long. Spores ellipsoid-ovoid, adaxially flattened, smooth, 9–11 × 5.5–6.5 μ; contents granular.

TYPE & SPECIMEN EXAMINED.—U.S.A., Louisiana (Lloyd, hb. Bourd. 8743, presumably part of Lloyd 2402, NY, hb. Burt-FH).

Cytidia tremellosa has been reduced to a synonym of *Cytidia pezizoides* (Pat.) Pat. (see above), described from Tonkin, by Martin (*1942:* 162, as a suggestion) and by W. B. Cooke (*1951:* 207). A careful re-examination of the types seems necessary: judging from my very incomplete notes I would not be surprised if the structure were more different than one would suspect from published descriptions.

CYTIDIA SIMULANS Lloyd

DESCRIPTION & ILLUSTRATION.—Talbot *in* Bothalia **6**: 478 *f. 18.* 1956.

In many ways a remarkable species (two kinds of basidiospores) collected once in South Africa. From Talbot's description one would conclude that this species has a typical hymenium (small, slender basidia), like *Auriculariopsis*. It is difficult to see why it should be considered congeneric with *Cytidia salicina*.

Other species referred to *Cytidia* but not discussed in the present paper: —
Cytidia lanata W. B. Cooke *in* Mycologia **43**: 205 *fs. 5, 9, 25.* 1951.
Cytidia stereoides W. B. Cooke *in* Mycologia **43**: 206 *fs. 7, 14, 21, 28.* 1951.

6.—AURICULARIOPSIS Maire

Auriculariopsis Maire *in* Bull. Soc. mycol. France **18** (Suppl.): 102. 1902.

Fruit-body at first thimble- to cup-shaped, sessile, remaining so or usually becoming rather flattened and often irregular in outline, up to rather large (–15 mm in diameter); outside tomentose, whitish; inside flesh-coloured, becoming brown, often radially veined. Substance rather thick-membranous, tough-gelatinous. Hyphae densely arranged parallel to hymenium, with more or less gelatinized wall, forming a dense layer below tomentum which is formed of loose, flexuous hyphae; clamp-connections present. Basidia densely packed, clavate, forming a regular, somewhat thickening palissade hymenium, about 30–35 × 4–5 μ, chiastic, 4-spored. Spores cylindrical, slightly curved, medium-sized (8–12 μ long), colourless ("légèrement teintées d'isabelle en masse", in the type species according to Bourdot & Galzin); wall smooth, non-amyloid.

On branches. Temperate Northern regions.

MONOTYPE.—*Cyphella ampla* Lév.

ONLY SPECIES.—*Auriculariopsis ampla* (Lév.) Maire.

Auriculariopsis was introduced for a single species, viz. *Cyphella ampla* Lév., which has an interesting history. Its subgelatinous tissue made it a troublesome species to place. It was for some time referred to *Auricularia* Bull. Thus Fuckel called it *Auricularia syringae* Fuck. Soon Quélet followed, with this difference that he recognized it as *Cyphella ampla* and renamed it *Auricularia leveillei* Quél. on the transfer. Suggestion soon played its tricks: Hennings (*1896:* 4–5) asserted of 'undisputable material' of *Auricularia leveillei* that it "gehört zweifellos zur Gattung *Auricularia*; sie besitzt die typischen geteilten und verzweigten Basidien, wie mir dies auch von Dr. A. Möller, dem ich Exemplare . . . zur Untersuchung mitteilte, bestätigt worden ist!" This is an error: the basidia are undivided with apical sterigmata as was already known to Léveillé ("basides tétraspores") and afterwards reported by Maire and Bresadola (*1903:* 111, "basidia clavata, apice 4-sterigmatica"). Moreover, the basidia are chiastic (apical and transversal mitoses) according to Maire (*1902:* 102 *pl. 3 f. 22*).[20]

When Maire studied *Cyphella ampla* he founded a special genus for it, *Auriculariopsis* Maire, stating that the species "diffère de *Cyphella* par sa texture gelatineuse qui

[20] Maire (*1900:* 123) originally stated that the spindle was directed along the length axis of the basidium.

le fait ressembler à s'y méprendre aux *Auricularia*; comme ces derniers, il se racornit par la sécheresse et se gonfle par l'humidité." He did not compare it with *Cytidia* Quél. The inclusion in *Lomatina* = *Cytidia* was performed by von Höhnel & Litschauer, who thus fused two elements that mainly agreed in gross characters such as habit and context of the fruit-body.

There is no doubt, in my opinion, that the types of *Cytidia* (*Corticium salicinum*) and of *Auriculariopsis* do not belong in the same genus: the two species have an entirely different structure of the hymenium as has already been explained under *Cytidia* (p. 71). The relations of *Auriculariopsis ampla* are apparently also with the Corticiaceae, but with a quite different group, more in particular with *Merulius* Fr. *sensu stricto* and I have been tempted for a long time simply to merge *Auriculariopsis* into that genus, and am not yet quite convinced that keeping the two apart is preferable. In any case *A. ampla* may be distinguished from *Merulius* by its centrally attached fruit-bodies, free all around, and by its hymenophore which becomes radially veined rather than merulioid (with reticulately connected veins when dry). Several species of *Merulius* (like *M. tremellosus* Schrad. per Fr.) have about the same structure and consistency.

Other species which like *A. ampla* possess typical euhymenia have been placed in *Cytidia*. As far as I know them they are not congeneric, although they might have been appended here rather than in *Cytidia* until their taxonomic position be better understood.

AURICULARIOPSIS AMPLA (Lév.) Maire

Cyphella ampla Lév. *in* Ann. Sci. nat. (Bot.) III **9**: 126. 1848. — *Chaetocypha ampla* (Lév.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — *Auriculariopsis ampla* (Lév.) Maire *in* Bull. Soc. mycol. France **18** (Suppl.): 102. 1902.

Cantharellus coemansii Rab., Fungi europ. exs. No. 209. 1860 (with description). — Type-distribution: Belgium, Ghent (Coemans; Rab., Fungi europ. exs. No. 209). — Fide Tul., Sel. Fung. Carp. **1**: 135. 1861 = *Cyphella ampla*.

Auricularia syringae Fuck. *in* Jb. nassau. Ver. Naturk. **27–28**: 9. 1873. — *Corticium syringae* (Fuck.) Wint. *in* Rab. Krypt.-Fl., 2. Aufl., Pilze **1**: 338. 1882. — Type distribution: Germany, near Hattenheim, "auf der Münchau" (Fuck., Fungi rhen. No. 2508). — Fide Höhn. & L. *in* S.B. Akad. Wiss. Wien (Math.-nat. Kl., Abt. I) **115**: 1586. 1906 = "*Lomatia flocculenta* (Fries) Lagerh."

Auricularia leveillei Quél. *in* Bull. Soc. bot. France **24**: 90. 1877 (nomen provisorium). — *Auricularia leveillei* Cooke & Quél., Clav. Hym. 213. 1878; Quél., Ench. Fung. 207. 1886. — *Hirneola leveillei* (Cooke & Quél.) Forq., Champ. sup. 109. "1886" [1888] (without reference or description, figure only) ≡ *Cyphella ampla* Lév.

Cyphella cyclas Cooke & Phill. *apud* Cooke *in* Grevillea **9**: 94. 1881. — *Chaetocypha cyclas* (Cooke & Phill. apud Cooke) O.K., Rev. Gen. Pl. **2**: 847. 1891. — Monotype: Great Britain, Ely (W. Marshall, K).

Auricularia bresadolae S. Schulz. *in* Hedwigia **24**: 148. 1885. — *Patila bresadolae* (S. Schulz.) O.K., Rev. Gen. Pl. **2**: 864. 1891. — Type locality: Slavonia, Vinkovce.

Stereum pubescens Burt *in* Ann. Missouri bot. Gdn **7**: 178 *pl. 5 f. 50.* 1920. — Holotype: U.S.A., Montana, Sheridan (L. A. Fitch, in Ellis Coll. NY, MO 56.784). — Fide Burt *in* Ann. Missouri bot. Gdn **11**: 10. 1924 = "*Cytidia flocculenta*".

MISAPPLICATIONS.—*Corticium flocculentum* (Fr.) Fr. *sensu* J. Schroet. *in* Krypt.-Fl. Schles. **3**

(1): 423. 1888; P. Henn. *in* Verh. bot. Ver. Brandenb. **37**: 5. 1896 (*Auricularia*; nomen provisorium); Bres. *in* Ann. mycol., Berl. **1**: 111. 1903 (*Cyphella*); Höhn. & L. *in* S.B. Akad. Wien (Math.-nat. Kl., Abt. I) **116**: 758. 1907 (*Cytidia*); Sacc. & Trott. *in* Sacc., Syll. Fung. **21**: 423. 1912 (*Auriculariopsis*).

DESCRIPTIONS & ILLUSTRATIONS.—Quélet *in* Bull. Soc. bot. France **26**: 231. 1880 (*Auricularia leveillei*); Patouillard, Tab. anal. Fung. **1**: 113 *f. 254.* 1884 (*Cyphella*); Bresadola *in* Ann. mycol., Berl. **1**: 111. 1903 (*Cyphella flocculenta*); Burt *in* Ann. Missouri bot. Gdn **11**: 9. *pl. 1 f. 7.* 1924, Bourdot & Galzin, Hym. France 146. 1928, Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 134. 1931, W. B. Cooke *in* Mycologia **43**: 204 *fs. 8, 10, 15, 16, 24.* 1951, & Cunningham *in* Trans. roy. Soc. New Zealand **84**: 232 *f. 1.* 1956 (*Cytidia flocculenta*).

TYPE.—According to original account, France, near Paris (comm. E. Germain, PC); Neuilly (K).

The favourite hosts of *Auriculariopsis ampla* are various species of *Populus* on which it is found throughout Europe, temperate North America, and occasionally in New Zealand (where it has probably been introduced). In the Netherlands it is rather common in the dunes from Oost-Voorne to north of Haarlem. The species also occurs occasionally on other substrata, as *Rubus* (the Netherlands); Cunningham (*1956:* 233) reports it from New Zealand from *Populus* sp., *Pyrus malus*, and *Salix babylonica*, one collection on each of these hosts.

The above synonymy is on the whole well established. Of *Cyphella ampla* I have seen the type material. Of *Cantharellus coemansii* Rab. and *Auricularia syringa* Fuck. one or more copies of the type-distributions could be studied.

The type of *Cyphella cyclas* Cooke & Phill. (K) is an unmistakable specimen of the present species. The following note is taken from a letter by W. Phillips accompanying the specimen and contains some information omitted from the original description.

". . . The exterior is coated with long white hairs rather matted. The hymenium is pale brown: there is an abundance of narrowly elliptic spores often curved, but I was not able to see any of these *in situ*. I concluded however these are the spores. The general outline [of the fruit-body] reminds one of the half of a bivalve shell laid flat on the wood . . .."

7.—STROMATOSCYPHA Donk

Porotheleum Fr., Obs. mycol. **2**: 272. 1818; Specimen Syst. mycol. 6. Dec. 18, 1818; (devalidated name). — *Polyporus* subgen. *Porotheleum* (Fr.) *per* Fr., Syst. mycol. **1**: 6, 506. 1821. — *Porotheleum* (Fr. per Fr.) Fr., Syst. Orb. veg. 80. 1825; Elench. **1**: 125. 1828; Reichenb., Consp. Regni veg. 14. 1828 & Fr., Gen. Hym. 12. 1836 ("*Porothelium*"); not *Porothelium* Eschw. (1824; Trypetheliaceae, Lichenes).

Stromatoscypha Donk *in* Reinwardtia **1**: 218. 1951 ≡ *Polyporus* subgen. *Porotheleum* (Fr.) per Fr.

Fruit-body consisting of numerous cups densely crowded on a common stroma. Cups globose, appearing closed then opening by an apical pore and becoming disk- to cup-shaped, at first distinct from each other (as can be seen near margin of stroma in not too mature fruit-bodies) then coalescing and becoming irregular by mutual

pressure and further growth and together finally strongly simulating the hymenophore of some species of *Poria*; outside of individual cups silky (by undifferentiated matted hyphal ends), white; hymenium smooth, even, yellowish; context rather floccose, not gelatinized, white. Stroma resupinate, membranous, rather tough, easily separable from substratum; margins more or less strongly byssoid to lacerate. Hyphae of stroma narrow, thick-walled, colourless, with clamp-connections; hyphae of cups parallel, thick-walled at outside and gradually thinner-walled towards hymenium; the outer hyphae not differentiated. Basidia short-clavate, rather small (15–25 μ long), 2–4 spored; sterigmata thin. Cystidia absent. Spores ellipsoid flattened at adaxial side, small (4–6 μ long); walls smooth, colourless, non-amyloid.

On rotten wood. Apparently of world-wide distribution.

LECTOTYPE.—*Poria fimbriata* Pers. = *Polyporus fimbriatus* (Pers.) per Fr. — Cf. Donk (*1951:* 217).

EXAMPLE.—*Stromatoscypha fimbriatum* (Pers. per Fr.) Donk.

As to the correct name for *Porotheleum* (Fr. per Fr.) Fr. (1825), it must be decided whether it is to be considered an (orthographically different) homonym of *Porothelium* Eschw. (1824; Lichenes) or not. Donk (*1951:* 218) concluded that the Friesian name is indeed to be treated merely as an orthographical variant of the earlier lichen name, and is hence illegitimate as a later homonym. He replaced it by *Stromatoscypha* Donk. This conclusion was refuted by W. B. Cooke (*1957:* 682), who thought the two names to be "different" and hence considered *Stromatoscypha* superfluous. There is no doubt, first, that the two names differ (in one letter), and, secondly, that they were given to widely different genera. On the other hand, they seem not to fall among the examples of names not likely to be confused with different termination (Code 1956: Art. 75): the difference is hardly one of termination as in both cases the last syllable is —um. It still is my considered opinion that *Porotheleum* and *Porothelium* fall within the category of names to be treated as orthographic variants, like *Astrostemma* and *Asterostemma*, *Pleuripetalum* and *Pleuropetalum*, *Columella* and *Columellia*, *Eschweilera* and *Eschweileria*, *Skytanthus* and *Scytanthus*, all examples added to Art. 75, the very same article invoked by Cooke (Code 1952: Art. 82).

In addition, it may be pointed out that from 1828, and in Fries's own work from 1836, onwards until I discussed the question, the name has been spelt *Porothelium*, with *-i-*, thus precisely the same as the lichen genus. This was done deliberately even by authors who knew the original spelling; for instance, Murrill (*1916:* 56) wrote "Porotheliaceae" but added, "The name of the genus on which this family is based was originally written *Porotheleum* . . ., but was soon afterwards changed to the form now in current use." This was apparently done because that form was considered the more correct one from an orthographic point of view. I am confident that I act in strict agreement with the Code when I take the fungus name *Porotheleum* as illegitimate and value it as a later, though orthographically slightly different, homonym.

Stromatoscypha is a very clear-cut and, as far as my knowledge goes, a monotypic

genus. [21] It has been repeatedly enriched with species, but few of the additions can stand a really critical examination. Some essential characters for distinguishing the genus are: Fruit-body consisting of a membranous, resupinate 'stroma' bearing originally globular cups, the hymenium lining the inside of the cups; walls of cups not gelatinous; spores smooth, colourless.

The cups become very crowded towards the centre of a stroma and then simulate the tube-layer of *Poria* Pers. per S. F. Gray (*sensu lato*), but merely to dump the genus into *Poria* is an over-simplification that is not defensible by the mere argument that it is certain to be classed as a *Poria* by collectors. A better solution is to tell the collector that after all he did not collect a species of *Poria*.

From some remarks scattered through the literature one might get the impression that the cup in *Stromatoscypha* is an originally closed (but hollow) globule which soon opens by an apical pore. Such a development would stamp the genus as a very remarkable one, destined to play an important rôle in phylogenetical speculations. However, I am convinced that the cups are open at the top from the start, although they pass through a stage in which the pore is hardly perceptible. The same phenomenon has been reported for the tubes of *Fistulina* (Lohwag & Follner, *1936*).

It really is a bizarre procession of fungi that have found a place in the present genus. Several so-called species of *Porotheleum* represent the resupinate hydnaceous fungus *Odontia sudans* (A. & S. per Fr.) Bres. = *Dacryobolus sudans* (A. & S. per Fr.) Fr.: see under *Dacryobolus* Fr. (p. 41). The inclusion of a stalked species of polypores as a typical species of the present genus is discussed on page 60. There is more of this kind. The best policy seems to be to exclude all species previously attributed to the genus except *Stromatoscypha fimbriatum*, and to admit additional species only after they have stood a critical test.

A recent development is the introduction of *Solenia poriaeformis* (Pers. per Mérat) Fuck. by W. B. Cooke (*1957:* 688): it also has a 'stroma' on (or, rather, in) which numerous cups are seated. It must be emphasized from the start that Cooke's conception of this species is too inclusive: several of the synonyms he lists represent easily distinguishable species. One of the synonyms is *Stigmatolemma incanum* Kalchbr. This South African species as described by Talbot (*1956:* 479 *f. 21*) seems to come close to *Peziza conspersa* Pers. (*Solenia grisella* Quél.) of Europe: it has similar, ellipsoid spores, quite different from the globose spores of *Solenia poriaeformis*. If *Stigmatolemma incanum* proves to have a gelatinous context like the other species mentioned, it should serve as the type species of a well-defined genus, *Stigmatolemma* Kalchbr. This genus would not only contain species with cups crowded on a common stroma (and which Cooke refers to *Porotheleum*), but also others with scattered cups not connected by any stroma (and which Cooke does not refer to *Porotheleum*). *Stigmatolemma* will be treated more fully on a future occasion. The genus clearly demonstrates not only

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[21] I am not able to state an opinion about the new species recently described by W. B. Cooke (*1957*). — Collections from Java are hardly specifically different, but I have not yet gone into this matter carefully.

that a 'stroma' by it self is not sufficient to define a genus in the 'Cyphellaceae', but also that the structure of the stroma should be taken into account.

STROMATOSCYPHA FIMBRIATUM (Pers. per Fr.) Donk

Poria fimbriata Pers. *in* Neues Mag. Bot. **1**: 109. 1794 (= Tent. 29. 1797) (devalidated name). — *Boletus fimbriatus* (Pers.) Pers., Syn. Fung. 546. 1801 (devalidated name). — *Porotheleum fimbriatum* (Pers.) Fr., Obs. mycol. **2**: 272. 1818 (devalidated name). — *Polyporus* (subgen. *Porotheleum*) *fimbriatus* (Pers.) *per* Fr., Syst. mycol. **1**: 506. 1821 ("*fimbriatum*"); Pers., Mycol. europ. **2**: 108. 1822; not *Polyporus fimbriatus* Fr. *in* Linnaea **5**: 520. 1830 & Syst. mycol. **3** (Ind.): 146. 1832; not *Polyporus fimbriatus* (Bull. per St.-Am.) Gillet, Champ. France, Hym. 662. 1878. — *Boletus fimbriatus* (Pers. per Fr.) Schw. *in* Schr. naturf. Ges. Leipz. **1**: 99. 1822; not *Boletus fimbriatus* Bull. *per* St.-Am., Fl. agen. 552. 1821. — *Porotheleum fimbriatum* (Pers. per Fr.) Fr., Syst. mycol. **3** (Ind.): 150. 1832; Epicr. 503. 1838. — *Poria fimbriata* (Pers. per Fr.) Lloyd, Mycol. Writ. **5**: 740 *fs. 1108, 1109.* 1917. — *Stromatoscypha fimbriatum* (Pers. per Fr.) Donk *in* Reinwardtia **1**: 219. 1951.

Peziza porioides A. & S., Consp. Fung. nisk. 327 *pl. 6 f. 5.* 1805 (devalidated name). — *Peziza porioides* A. & S. *per* Pers., Mycol. europ. **1**: 275. 1822; Fr., Syst. mycol. **2**: 111. 1822. — *Solenia porioides* (A. & S. per Pers.: Fr.) Fuck. *in* Jb. nassau. Ver. Naturk. **27–28**: 6. 1873; misapplied. — *Phialea porioides* (A. & S. per Pers.: Fr.) Gillet, Champ. France, Disc. 112. 1881. — *Cyphella porioides* (A. & S. per Pers.: Fr.) Quél., Ench. Fung. 215. 1886. — *Eriopeziza porioides* (A. & S. per Pers.: Fr.) Rehm *in* Rab. Krypt.-Fl., 2. Aufl., Pilze **3**: 697. [1892]. — *Henningsomyces porioides* (A. & S. per Pers.: Fr.) O.K., Rev. Gen. Pl. **3** (2): 483. 1898 ("*porioides*"). — Type locality: Germany, Oberlausitz, Moholzer Haide. Type: L 910.261–510.

Boletus pezizoides Schw. *in* Schr. naturf. Ges. Leipz. **1**: 100. 1822. — *Polyporus pezizoides* (Schw.) Steud., Nomencl. bot. Pl. crypt. 348. 1824. — *Porotheleum pezizoides* (Schw.) Schw. *in* Trans. Amer. phil. Soc. II **4**: 160. 1832. — Type locality: U.S.A., N. Carolina. Type: UPS, cf. Lloyd, Mycol. Writ. **3**: 423. 1909.

[*Boletus*] "*Polyporus*" *fimbriatus-supinus* Secr., Mycogr. suisse **3**: 164. 1833 ("*fimbriatus supinus*") ≡ *Poria fimbriata* Pers.

Porotheleum lacerum Fr., Obs. mycol. **2**: 273. 1818 (devalidated name). — *Porotheleum lacerum* Fr. *per* Fr., Elench. **1**: 125. 1828 & Syst. mycol. **3** (Ind.): 150. 1832 (nomen nudum?); Epicr. 503. 1838. — Type locality: Sweden.

Boletus byssinus Schrad., Spic. Fl. germ. 172 *pl. 3 f. 1.* 1794 (devalidated name). — *Poria byssina* (Schrad.) Fr., Syst. mycol. **3** (Ind.): 149. 1832 (as a synonym). — *Poria byssina* (Schrad.) *per* Quél., Fl. mycol. France 383. 1888, misapplied. — *Physisporus byssinus* (Schrad. per Quél.) Cost. & Duf., Nouv. Fl. Champ. 138. 1891, misapplied. — *Tyromyces byssinus* (Schrad. per Quél.) Bond., Trutov. Griby 164. 1953 ("Pers."; incomplete reference), misapplied. — Type locality: Germany, Braunschweig.

Poria brevipora Speg. *in* An. Mus. nac. Hist. nat. Buenos Aires **4**: 172. 1899. — Type locality: Argentina, Boca del Riachuelo near Buenos Aires. — Fide Bres. *in* Ann. mycol., Berl. **14**: 228. 1916 = *Porotheleum fimbriatum.*

DESCRIPTIONS & ILLUSTRATIONS.—Patouillard, Essai taxon. Hym. 57 *f. 39.* 1900 (*Porothelium*); Lloyd, Mycol. Writ. **5**: 740 *fs. 1108*,[22] *1109.* 1917 (*Poria*); Bourdot & Galzin, Hym. France 166.1928 (*Porothelium*); Lowe *in* Techn. Bull., New York St. Coll. For. No. 65: 74. 1946 (*Poria*); W. B. Cooke *in* Mycologia **49**: 684. 1957 (*Porotheleum*).

TYPE.—"*Boletus fimbriatus* Syn. fung. p. 546 / *Polyporus fimbriatus.* Myc. E. p. 108. *Boletus* —— Syn. fung. / Germania" (L 910.263–941).[22]

[22] For a photograph of the biggest portion of the type from Persoon's herbarium, see Lloyd (*1917: f. 1108* on p. 740).

Persoon's original description of *Poria fimbriata* (1794) is too short for certain recognition of the species, but when supplemented with his subsequent one (1801) and the specimens is his herbarium (including the type, cited above), there is no doubt possible as to the fungus he had in mind. Although not common, the species is wide-spread throughout West Europe and easy to define by its well-developed stroma with strongly developed fibrillose-laciniate margin, and bearing cups of separate origin but soon crowded and then collectively very similar to the hymenophore of a species of *Poria*. There is only one species of this kind in Europe, which facilitates the pigeon-holing of synonyms. Persoon (*1801:* 546) very clearly emphasized the most characteristic features: "Membranam siccam exhibit. Margo laciniatus: laciniae teres. Pori superficiales, in fungi margine liberi s. inter se subdistant."

Boletus byssinus Schrad. has been variously interpreted. Persoon, at first as a suggestion (*1801:* 548) and later on positively (*1825:* 108), and Fries (*1821:* 506) identified it with the present species. In my opinion, this is the best disposition at hand and apparently the correct one: the original account and figure are very suggestive: ". . . explanatus membranaceus niveus: margine fimbriato . . .. Membrana byssacea, late aliquando supra truncos expansa, nivea . . . poris subrotundis obtusis . . . brevissimis, minutis . . ." The figure suggests that a small stroma in young condition was selected for the artist; the scattered 'pores' had not yet become a crowded mass at the centre. In any case the original account does not at all suggest a tender species with true pores. In later years Fries (*1832:* 149) referred the fungus to *Peziza porioides* A. & S., which, I think, is another synonym of *Stromatoscypha fimbriatum*, as will presently be discussed. A detailed discussion of the misinterpretations of *Boletus byssinus* as species of *Poria* Pers. per S. F. Gray (artificial sense) is reserved for a forthcoming paper.

I believe that *Peziza porioides* A. & S. is another synonym. The rather detailed original description as well as the figure leave hardly any room for a different interpretation. As in the preceding case a small, young stroma was depicted, presumably to avoid too many technical difficulties on the copper plate. To underline this conclusion it is pointed out that *Peziza porioides* is "tota nivea" and that the margin of the stroma is 'byssinum passim fibrilloso-fimbriatum'. In the Leiden copy of the "Conspectus" the white colour of the hand-painted plates have everywhere turned grey. Such a colour deviation in connection with the small colonies depicted might suggest a different species (like *Solenia grisella* Quél.) if the original text is only superficially consulted. Another reason for misunderstanding is that von Albertini & von Schweinitz considered their fungus different from *Poria byssina*, discussed above. Perhaps the substratum (". . . in cortibus lignisque abiegnis . . .") is somewhat exceptional, but *Porotheleum fimbriatum* is not selective and has been found on fallen branches of pine. It is surprising to find that only Persoon (*1822:* 275) has thought of *Porotheleum*, more in particular of *P. lacerum* Fr., in connection with it. Evidently following this lead some later authors (Wallroth, *1833:* 480; Rehm) placed *P. lacerum* as a (dubious) synonym under *Peziza porioides*. Merely

judging from the original account Rehm (l.c.) suspected it to be a species of *Eriopeziza* Sacc. — This paragraph had already been written when I came across a specimen in Persoon's herbarium sent by the authors. The original label reads, "*Peziza porioides*". To this Persoon added, "Consp. fung. p." and "Ex Lusatia superiore." The substratum impresses me as the bark of a coniferous branch and the fungus on it is a portion of a young fruit-body, with rather poorly developed stroma and rather spaced cups; it is evidently *Stromatoscypha* and in my opinion represents *S. fimbriatum.*

Peziza porioides has been misinterpreted by Fuckel (l.c.). He, and, under his influence, other mycologists have used the names *Solenia porioides* or *Cyphella porioides* for a species which has also been called *Peziza conspersa* Pers. and *Solenia grisella* Quél. The latter species is very different from *Stromatoscypha fimbriatum:* its 'stroma' is a thin, closely adherent felt (rather than a membrane) not forming laciniae at the margin, and the colonies as a rule are small greyish patches on fallen branches of conifers. Neither is this fungus to be identified with *Solenia poriaeformis* (Pers. per Mérat) Fuck. as W. B. Cooke (*1957:* 688) does. *Peziza conspersa* seems to belong to *Stigmatolemma* Kalchbr. if the type of the latter species has been correctly interpreted by W. B. Cooke.

Porotheleum lacerum was one of the two original species of *Porotheleum* (1818), the other being *P. fimbriatum.* As late as *1874* Fries (p. 595) stated to have found it only once. Some years after its publication Fries (1821) suppressed it altogether (not even mentioning it in synonymy), but restored it as a good species after having received *Boletus pezizoides* from von Schweinitz, which fungus he thought exactly the same (1838). He differentiated it from *P. fimbriatum* by the margin of the stroma: "ambitu floccoso-byssino", in the former, and "ambitu laciniis teretibus fimbriato", in the other species; the cups are ". . . demumque abeuntibus in tubulos cylindricos distortos". According to Lloyd (*1917:* 740), "*Porothelium lacerum* as named by Fries in Europe is the same as *Porothelium fimbriatum.* Fries did not recognize the old (*Poria*) state." This disposition is now the one accepted by the few authors who mention *Porothelium lacerum* at all.

American authors now also accept *Boletus pezizoides* as a synonym; following Lloyd (*1917:* 740), who stated "*Porothelium pezizoides* as named by Schweinitz . . . [is] . . . based on the young, papillate condition." Fries thought it to be the same as his *Porotheleum lacerum.* Berkeley & Curtis (*1856:* 214) concluded that "this species differs from *P*[*orothelium*] *fimbriatum* only in the absence of the marginal threadlike processes. There is a [specimen] in Hook. Herb. from Schweinitz marked *Boletus obliteratus.*"

Several other synonyms have been listed in connection with *Stromatoscypha fimbriatum: Fimbrillaria stellata* Sow., *Porotheleum friesii* Mont., *P. vaillantii* (DC. per Fr.) Quél., *Boletus tunicatus* Schum. These are discussed in a preceding chapter, section "Excluded species".

W. B. Cooke (*1957:* 684) lists also *Polyporus fatiscens* Berk. & Rav. apud Berk. as another synonym of *Porotheleum fimbriatum.* However, recently Lowe (*1959:* 103)

reports *Poria fatiscens* (Berk. & Rav. apud Berk.) Cooke as a true species of *Poria* (*sensu lato*, but exclusive of *Porotheleum*) which is widely distributed in North America.

8.—**Cellypha** Donk, *gen. nov.*[23]

Cyphella subgen. *Glabrotricha* Pilát *in* Ann. mycol., Berl. **23**: 148. 1925; *in* Publ. Fac. Sci. Univ. Charles No. 29: 30. 1925. — Type (selected): *Cyphella lactea* Bres.

Receptaculum plus minusve cupuliforme, basi rotundatum vel substipitiformi-attenuatum, extus album et subconspicue tomentosum, pilis patentibus basi fibulatis, inseptatis, filiformibus, capitatis, tenuiter usque firmule tunicatis indutum, margine in sicco haud involutum; hymenium subceraceum, laeve vel rugulosum saepiusque obscure radiato-plicatum; contextus monomiticus. Hyphae tenuiter tunicatae, fibulatae. Basidia clavata, sterigmatibus 2–4. Sporae ellipsoideae, plus minus claviformes, mediocres vel satis longae, hyalinae; paries laevis, haud amyloideus. — Typus: *Cyphella* sp. = C. Bas 1519 (L 958.140–484).

Fruit-body more or less cup-shaped, erect to pendulous, small (0.5–3 mm), sessile with rounded cup to spuriously short-stalked, white outside and rather conspicuously tomentose; margin not becoming inrolled; outside clothed with patent hairs with clamp-connections at the base, undivided, narrow, cylindrical, capitate, thin- to somewhat firm-walled; hymenium rather waxy, smooth to wrinkled and often even with folds radiating towards margin; context monomitic, of thin-walled, hyphae with clamp-connections. Basidia clavate, with 2–4 apical sterigmata. Spores ellipsoid and more or less club-shaped, medium-sized to rather long (10–18 μ long), colourless; wall smooth, non-amyloid.

On dead stalks, culms, twigs, bark.

TYPE SPECIES.—*Cyphella goldbachii* Weinm. (in the sense indicated below). Generic type specimen: C. Bas 1519 (L 958.140–484).

A very distinct and monotypic genus easily recognizable by the quite typical, capitate hairs at the outside of the cups. Its affinity is still doubtful, but I would rather suggest that it is mycenoid. Romagnesi (*1950*), who calls this fungus *Cyphella lactea*, likens the spores to those of *Omphalia* (Fr.) Kummer (restricted sense) and the hairs to those of *O. cephalotricha* Josserand [= *Mycena cephalotricha* (Joss.) Kühner], a species classed by Kühner in *Mycena* sect. *Lacteae* Konr. & Maubl. = *Mycena* sect. *Candidae* Kühner = *Marasmiellus* sect. *Candidi* (Kühner) Sing. These 'pilo-cystidia', as described by Josserand (*1937:* 86–87), are deflected ends of the hyphae of the flesh of the cap; they are very numerous, slender, very sinuous, 20–60 × 3 μ, capitate by a well-defined, often somewhat flattened head of 5–6 μ in diameter. It may be that the likeness is only superficial. Clamp-connections are not mentioned in the description and are lacking at the base of the hairs drawn in the figure. *Omphalia cephalotricha* is a typical agaric in appearance: the fruit-body consists of a stalked cap with typical gills.

Calyptella lacks the coating of hairs (at least of such hairs that are sharply set off at their base), has a more waxy to tough-gelatinous context, a more typically trumpet-shaped fruit-body, and a distinct, constant stalk.

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[23] An anagram of the name *Cyphella*.

Cellypha goldbachii (Weinm.) Donk, *comb. nov.*

? *Peziza cuticulosa* Dicks., Fasc. Pl. crypt. Brit. **3**: 22 *pl. 9 f. 11.* 1793 (devalidated name). — *Peziza cuticulosa* Dicks. *per* Purt., App. Midl. Fl. 263. 1821; Pers., Mycol. europ. **1**: 317. 1822; Fr., Syst. mycol. **2**: 148. 1822 (nomen); **3** (Ind.): 130. 1832. — *Cyphella cuticulosa* (Dicks. per Purt.: Fr.) Berk. *in* J. E. Sm., Engl. Fl. **5** (2): 215. 1836. — *Chaetocypha cuticulosa* (Dicks. per Purt.: Fr.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — Type locality: Great Britain, Walthamston (B. M. Forster).

Cyphella goldbachii Weinm., Hym.- & Gastero-myc. ross. 522. 1836; Fr., Epicr. 569. 1838. — *Calyptella goldbachii* (Weinm.) Quél., Ench. Fung. 216. 1886.

Cyphella ochroleuca Berk. & Br. *in* Ann. Mag. nat. Hist. II **13**: 405. 1854. — *Chaetocypha ochroleuca* (Berk. & Br.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — *Calyptella ochroleuca* (Berk. & Br.) Big. & Guill., Fl. Champ. sup. France, Compl. 483. 1913. — *Phaeocyphella ochroleuca* (Berk. & Br.) Rea, Brit. Bas. 704. 1922. — Type: Great Britain, Batheaston (Broome 179, K).

Cyphella rubi Fuck. *in* Jb. nassau. Ver. Naturk. **23-24**: 26. "1869" [1870]. — *Chaetocypha rubi* (Fuck.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — *Calyptella rubi* (Fuck.) Big. & Guill., Fl. Champ. sup. France, Compl. 483. 1913. — *Cyphella lactea* var. *rubi* (Fuck.) Pilát *in* Ann. mycol., Berl. **23**: 149 *f. 12 D-G.* 1925; *in* Publ. Fac. Sci. Univ. Charles No. 29: 31 *f. 11 D-G.* 1925. — Type locality: Germany, Rheinland, near Eberbach.

Cyphella caricina Peck *in* Rep. New York St. Mus. **33**: 22. 1880 (n.v.). — Type: U.S.A., New York, Verona (Peck, NYS).

Cyphella dumetorum Bomm. & Rouss., Fl. mycol. Bruxelles 88. 1884; Sacc., Syll. Fung. **6**: 677. 1888. — *Chaetocypha dumetorum* (Bomm. & Rouss.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — Type locality: Belgium, near Brussels.

Cyphella lactea Bres., Fungi tridentini **1**: 61 *pl. 67 f. 2.* 1884. — *Calyptella goldbachii* var. *lactea* (Bres.) Quél., Ench. Fung. 216. 1886. — *Chaetocypha lactea* (Bres.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — *Calyptella lactea* (Bres.) Big. & Guill., Fl. Champ. sup. France, Compl. 482. 1913. — Type locality: Italy, Trentino.

Cyphella malbranchei Pat., Tab. anal. Fung. **1**: 204 *f. 466.* 1886; Malbranche *in* Bull. Soc. mycol. France **4**: xxxii. 1888. — *Solenia malbranchei* (Pat.) Pat., Hym. Eur. text to *pl. 3 f. 30* (figure of spores only, no reference, no description); Sacc. & Trav. *in* Sacc., Syll. Fung. **20**: 803. 1911. — *Chaetocypha malbranchei* (Pat.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — Type locality: France, Normandy (Letendre, comm. Malbranche).

Cyphella velenovskýi Pilát *in* Ann. mycol., Berl. **22**: 206. *pl. 1 f. 13.* 1924. — Monotype: Bohemia, near Budyně (O. Reisner).

MISAPPLICATION.—*Cyphella griseopallida* Weinm. *sensu* Fuck. *in* Jb. nassau. Ver. Naturk. **25-26**: 291. 1871.

DESCRIPTIONS & ILLUSTRATIONS.—Berkeley, Outl. Brit. Fung. 278. 1860 (*Cyphella goldbachii*); Patouillard, Tab. anal. Fung. **1**: 204 *f. 466.* 1886, Malbranche *in* Bull. Soc. mycol. France **4**: xxxii. 1888, Saccardo, Syll. Fung. **6**: 676. 1888 (all as *Cyphella malbranchei*); Rea, Brit. Bas. 701. 1922, Bourdot & Galzin, Hym. France 157. 1928 (both as *Cyphella lactea*); Pilát *in* Ann. mycol., Berl. **23**: 149 *f. 12 D-G.* 1925 (*Cyphella lactea* var. *rubi*); Overholts *in* Mycologia **26**: *pl. 54 f. 3.* 1934 (*Cyphella caricina*); Reid *in* Trans. Brit. mycol. Soc. **38**: 397. 1955 (*Cyphella lactea*) & **41**: 438 *f. 22.* 1958 (*Cyphella ochroleuca*).

This species is well characterized by its usually sessile fruit-bodies generally connected by a white, fibrillose mycelium, clothed at the white outside with slender, capitate hairs, and by its long, more or less clavate spores. The latter vary considerably in length: usually they measure from 10–15 μ in length, but in one collection (France, Puy-de-Dôme, leg. Brevière) they reach as much as 14–18 μ.

Reid (*1955:* 397) describes the outside of the fruit-body thus: "From the outermost hyphae of the context, there arise others which are branched, septate, and clamped,

forming a loose tangled weft. These give rise to certain branches that grow out to form characteristic clavate hairs, up to 39 μ long, and 2 μ wide, with swollen heads 3–6 μ in diameter, which may or may not be septate, but if so these septa lack clamps, and are therefore secondary."

The following description is from the notes by Mr. C. Bas accompanying the specimen indicated above as ultimate type of the generic name (translated and adapted): Fruit-body crucible- to cup-shaped, originally disk-shaped, sessile, –1.5 mm in diameter, –1 mm high, white throughout, outside pubescent (capitate ends of the individual hairs visible at 32 ×); margin at first incurved but even very young stages already with aperture. Spores 12.4–13.5 × 3.4–3.6 μ (inclusive of apiculus), slender, clavate with slightly curved base, non-amyloid. Basidia 4-spored, 29–35 × 7.2–7.9 μ, with basal clamp; sterigmata curved, –5.5 μ long. Hairs 23–58 μ long, hypha-like, sinuous, occasionally somewhat granular-incrusted at the middle portion, colourless, with basal clamp, somewhat tapering up to the capitate end, 3.0–3.6 μ in diameter at the base, 2.2–2.5 μ in diameter halfway up; capitate end 3.6–6.1 μ in diameter. Hyphae of context 2.5–4 μ wide, rather thin-walled, colourless, with clamp connections. No positive reactions with Melzer's solution.

TYPE LOCALITY.—Russia.

SPECIMENS EXAMINED.—GERMANY, Oestricher Wald am Bachweg, on bark of *Lonicera xylosteum*, spring (Fuck., Fung. rhenani Exs. No. 2393, as *Cyphella griseopallida*; hb. Oud.-GRO); Leipzig, June, on culms and leaves of *Dactylis* (Auerswald, hb. J. Schroet.-BRSL, as *Cyphella goldbachii*); Niederwald near Rastatt, June (J. Schroet., hb. J. Schroet.-BRSL, as *Cyphella rubi*). CZECHOSLOVAKIA, Zwanovice, August, on twigs of *Rubus suberectus* (Pilát, as *Cyphella lactea* var. *rubi*, hb. Donk). BELGIUM, Malmédy, winter (Libert, Rel. Libert. II No. 458 distributed by Roum., Fung. gall. exs. No. 1410, as *Cyphella erucaeformis*, BP). FRANCE, Arlanc, Puy-de-Dôme, October, on *Baldingera arundinacea* (= *Phalaris arundinacea*) (L. Brevière, det. Patouillard as *Cyphella malbranchei*, PC); Beziers, March, on *Juncus maritimus* (A. de Crozals, hb. Boud.-PC, as *Cyphella malbranchei*). NETHERLANDS, Zuid-Holland, Leiden, Leidse Hout, on dead culms of *Holcus lanatus* (C. Bas 1519, L 958.140–484); Zeeland, Onrustpolder (W. G. Beeftink, L 958.339–093). GREAT BRITAIN, Norfolk, Horsey, on leaves of *Carex riparia* (Dennis, K, L 958.004–093). SWEDEN, Upland, Bondkyrka parish, on dead culms of *Glyceria altissima* and *Carex hudsonii* (Lundell, Lund. & Nannf., Fungi exs. suec. No. 1026), Halland, Onsala parish (L. Holm 194, Lund. & Nannf., Fungi exs. suec. No. 1423).

Cellypha goldbachii is noteworthy by the diversity of substrates on which it is found. Dead bramble twigs are a favourite host, but so are culms and leaves of several grasses, *Carex* spp., and so on; it may even be found on twigs and bark. This lack of preference is one of the reasons that it was repeatedly described as new, because Fries classified the species of *Cyphella* according to habitat.

Easily recognizable as it is, this species offers considerable difficulties in establishing its correct name.

Perhaps the first name given to the present fungus is *Peziza cuticulosa* Dicks., but all in all it should be concluded, I think, that Dickson's name is to be rejected as a nomen dubium. The original description is very brief, "acaulis cyathiformis membranacea alba, margine acuto". The accompanying figure depicts a species with fruit-bodies remarkably variable in shape, from cup-shaped with rounded base to truncate-clavate. The substratum is decayed grass. Berkeley & Broome (*1854*: 405)

rejected the name as the correct one for their *Cyphella goldbachii* because Dickson did not mention the existence of any indument, and we still have no indication of its exsistence.

The next two, simultaneously published, names to be seriously considered are *Cyphella goldbachii* and *C. griseopallida*. Both have been interpreted as representing the present species, but they have both also been applied to quite different fungi. Two of the species brought into connection with these names are:

(i) The present fungus: cups milk-white, externally villose with conspicuously capitate hairs; spores rather clavate, long (10–18 μ).

(ii) Cups pale grey (or white in var. *alba*) finely pubescent; spores obovate, 5–7 × 4–5 (or 5–7.5 × 5.5–6 μ in var. *alba*). (I rely on Bourdot & Galzin, *1928:* 158, as *C. griseopallida*, for details.)

If the fruit-bodies of these two species were described in the concise Friesian manner (and leaving out microscopical data), the resulting characterizations would become closely alike. The colour of the fruit-body and the nature of the indument would have to furnish the differentiating words.

Because the colour of *C. griseopallida* was originally described as "tota griseopallida", and as "albida, intus pallida" in *C. goldbachii*, the former may be regarded as different from species (i) and as correctly interpreted by Bourdot & Galzin (l.c.), who so called species (ii). However, the name *C. griseopallida* has been applied by some authors to species (i) (Fuckel, *1871:* 291), or used in an inclusive sense to comprise also species (i) (Quélet, *1886:* 215).

Cyphella goldbachii was described as "extus villosa" against "extus floccosa" in *C. griseo-pallida*. I think that Berkely (Berkeley & Broome *1854:* 405; Berkeley, *1860:* 278) applied the former name correctly to species (i), but the evidence is slight ("villous coat")[24]; by a note of exclamation Berkeley & Broome presumably indicated they had seen material sent by the originator of the name (Weinmann). Granting that the original diagnosis is poor and also that it takes a lot of goodwill to consider Berkeley's interpretation as covering species (i), I yet venture to apply this name to the latter.

Cyphella goldbachii has been also differently interpreted: compare Patouillard (*1883:* 19 *f. 33*) and Quélet (*1888:* 26, as *Calyptella*). Pilát (*1925a:* 158) thus calls a sterile fungus of which he states, "Haare zylindrisch, dicht mit Stäbchen von Kalziumoxalat inkrustiert, farblos, dünnwandig, einzellig, 4–5 μ dick, 100–150 μ lang."

Fries (*1838:* 569) placed *Chaetocypha variabilis* Corda as a synonym under *Cyphella goldbachii*. Corda's fungus is certainly quite unlike any of the species that have been called *C. goldbachii* and it is doubtful whether it is a basidiomycete at all (cf. Donk *1951:* 208; see p. 40).

If one rejected the name *Cyphella goldbachii* as too uncertain for application, the next

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[24] Berkeley & Broome remarked: "This is very near *C. cuticulosa*, from which it differs in its villous coat . . . almost visible to the naked eye."

one to be taken into consideration is *C. ochroleuca:* "A pretty little species allied to *C. Goldbachii.*"—Berkeley & Broome. The substratum ("dead leaves of *Aira caespitosa*" in *C. goldbachii*) seems to have been the decisive factor for separation. The original description (which lacks microscopical data) and the substratum ("decayed bramble twigs") agree well and I have little doubt that the fungus is the same as *C. goldbachii* as here interpreted. There is one complication to smooth out. Massee (*1892:* 143), who may be credited with studying the type, recorded the spores as "very pale ochraceous, elliptical, 6 × 4 μ", the reason why the species was transferred to *Phaeocyphella* by Rea (l.c.). However, it seems likely that Massee took the swollen tips of the hairs at the outside of the fruit-body as spores. The dimensions and shape agree and these swollen portions appear slightly yellowish under the microscope by their plasmatic contents. Recently Reid (*1958:* 439) re-examined the type and concluded that *Cyphella ochroleuca* is the correct name for *Cyphella lactea.*

A substratum on which this omnivorous species is often found is bramble twigs. Besides *Cyphella ochroleuca*, *C. rubi* is based on a collection growing on bramble twigs. The description leaves no doubt ("nivea, extus villosus, . . . sporidiis obovato-clavatis").

When on another occasion Fuckel (*1871:* 291) collected this fungus "in den Rissen, alter, dürrer Rinde von *Lonicera Xylosteum*", he determined and distributed it as *Cyphella griseopallida.* He described the characteristic hairs (erroneously stating that he found them at the inner side) and the equally characteristic spores (ovoid-club-shaped, 10–12 × 4–6 μ). A sample of the distribution was studied and confirmed this conclusion.

It looks as if the present species is much rarer in North America than in Europe. American authors have not recorded it under any of the several European names. However, that it does occur there seems proven by the publication of *Cyphella caricina* Peck. Burt (*1914:* 366), when redescribing it, gave the spores as "lanceolate or subclavate, pointed at base, 8–13 × 4 μ". He also depicted them (op. cit., *pl. 19 f. 8)* and remarked that "the spores of the type are noteworthy by their tapering base". The very evident hairs (if I am correct in attributing this fungus to *C. goldbachii*) escaped him.

The description leaves no doubt that *Cyphella dumetorum* is another synonym; compare "Spores . . . obtuses au sommet, subaiguës à l'autre extrémité, 12–15 [×] 3,5." It was found on "des sarment de ronce [*Rubus*] et des tiges desséchées d'*Urtica dioica*, sous des buissons épais".

Bresadola called the present species *Cyphella lactea.* His account (including the spores) and his picture remove all doubt about the identity. This name is the one at present most commonly used. Pilát (*1925a:* 149) made *C. rubi* a variety of *C. lactea*, stating that it is up to four times as large and has a strongly folded hymenium. A part of the one collection on which Pilát based his description could be examined and shows nothing unusual. Bresadola (*1887:* 104) defended his species a few years later by remarking that it differed from *C. goldbachii* by the differently shaped

(clavate) and twice larger spores. I have been unable to locate a description by Bresadola to find out what precisely he understood by *C. goldbachii.*

At the same time Bresadola referred *Cyphella malbranchei* Pat. to his *C. lactea.* In this case, too, the published original account is quite sufficient to accept this conclusion. Moreover, a specimen named by Patouillard himself could be studied and proved to be the present species.

The last contribution to the list of synonyms seems one by Pilát: *Cyphella velenovskýi.* The original description speaks of a stalked fruit-body (rather an unusual condition in *C. goldbachii*[25]) and of spores 10–12 × 2–3 μ, "longe cylindraceis, saepe subcurvulis, apice paullum attenuatis, postice breviter in cuspidem plus minus contractis." Afterwards the author (Pilát, *1927:* 117) also recorded sessile fruit-bodies from an additional collection and remarked about the spores that they were "immer sehr charakteristisch. Sie sind zylindrisch und 9–12 × 2.5–3.2 μ gross", moreover emphasizing that the fruit-bodies are "fast kahl und nicht wie bei *Cyphella lactea* Bres. mit characteristischen Haaren bekleidet. Nach meiner Meinung ist *Cyphella Velenovskýi* Pil. eine ziemlich gute Art, ob zwar sie mit *Cyphella lactea* Bres. sehr nahe verwandt ist." Again some years later he wrote to me that he then regarded it as a synonym of *C. lactea:* "Ist nur eine Form von *C. lactea* Bres. mit engeren Sporen." If this be true, I assume that the hairs were present after all, for otherwise the identity would be highly questionable.

9.—**Pellidiscus** Donk, *gen. nov.*[26]

Receptaculum discoideum, margine elevato, centro affixum, minutum, album, tomentosum; hymenium pelliculare, subceraceum, laeve vel rugulosum, denique subochraceum; contextus monomiticus. Hyphae tenuiter tunicatae, haud fibulatae. Basidia clavata, sterigmatibus 2–4. Sporae ovoideo-ellipsoideae subamygdaliformes, mediocres, melleae sub microscopio; paries minute verruculosus, haud amyloideus. — Typus: *Cyphella pallida* Berk. & Br.

Fruit-body disk-shaped (when fresh or re-soaked), small (0.5–2 mm), loosely attached to substratum except for elevated margins, white outside; margin even or becoming crisped and lobed, the outside clothed with thin-walled, not encrusted, simple (rarely sparingly branched) hairs; hymenium lining the 'disk', pellicular and somewhat waxy, smooth to wrinkled (when fresh), becoming pale ochraceous; context poorly developed, floccose, monomitic. Hyphae thin-walled, without clamps. Basidia club-shaped, with 2–4 apical sterigmata. Spores ovoid-ellipsoid, medium-sized (about 7 μ long), appearing pale honey-coloured under the microscope; wall minutely warted (use high magnification), non-amyloid.

Epixylous, or on dead herbs and leaves.

TYPE SPECIES.—*Cyphella pallida* Berk. & Br.

The only species included in this genus originally impressed me as having fruit-bodies very much like those of *Athelia* Pers. (for instance *A. epiphylla* Pers.; cf. Donk, *1957b:* 12) except that they were not indeterminate but clearly marginate, in short,

[25] Pilát (*1924: pl. 1 f. 9*) figures both sessile and substipitate fruit-bodies for *Cyphella lactea.*

[26] From Lat. pellis, thin skin, an allusion to *Corticium* sect. *Pellicularia* Bourd. & G.; and Lat. discus, quoit.

as a discoid species of that genus. More careful and repeated examination brought to light a series of features quite inconsistent with the first impression. It was found not only that the spores were faintly (but undeniably) coloured, but also that their surface was punctate and their shape of a peculiar variability. The combination of these features is very suggestive and I now incline to the view that *Pellidiscus* is perhaps a genus with 'reduced' fruit-bodies very close to *Crepidotus* (Fr.) Staude.

Romagnesi (*1950*) had the present genus in mind when he mentioned as examples of "Agarics cyphelloides" two species as follows: "*C*[*yphella*] *Bloxami* et *albina:* spore verruculeuse, jaune une fois collapsée, hyphes sans boucles, poils subulés cf. *Pleurotellus pubescens*." It may be that '*albina*' is an error for '*pallida*'. His more elaborate account runs thus:—

"[Chez le] groupe de *Cyphella Bloxami* Pilát (= *C. ciliata* Fr. sensu Bourdot-Galzin), une autre affinité se révèle: la spore de cette espèce, et d'une forme lignicole très voisine, un peu plus grande, reccuillie par nous sur l'écorce de *Salix* sp., se montre finement verruqueuse; lorsqu'elle se collapse et se vide de son contenu, elle prend une couleur jaune d'or, et rappelle de façon frappante celle d'une petite Pleurotacée, *Dochmiopus* [= *Crepidotus*] *pubescens* ss. Schröter; cette parenté est confirmée par l'absence de boucles aux cloisons des hyphes, et surtout par la quasi insensibilité de leur paroi au Bleu de Crésyl . . .."—Romagnesi (*1953:* 409).

The 'hairs' from the marginal region (as described for the species) look very much like sterile bunches of basidia of which each 'basidium' develops an apical hyphal outgrowth. I would assume that by continued marginal growth of the fruit-body these hairs become displaced towards the sterile side of the fruit-body: this would imply that that side is covered by a trichoderm or, if one wishes to call it so, a hymenoderm, depending on the stress one lays on the swollen basal portions of the hairs. The very young fruit-bodies are attached by a point, but gradually, when the cup-shaped fruit-body turns into a more disk-shaped one, they become more broadly and loosely attached to the substratum. The question now arises if it could not be the hairs that grow out and loosely connects the outside of the fruit-body with the substratum.

Cyphella fraxinicola Berk. & Br. should be carefully compared with *Pellidiscus*. It has also brownish spores and small, white, disk-shaped fruit-bodies; but it differs in several points. It has recently been well described by Reid (*1958:* 439). I intend to return to it in a subsequent part of the present series.

Pellidiscus pallidus (Berk. & Br.) Donk, *comb. nov.*

Cyphella pallida Berk. & Br. *in* Rab., Fung. europ. exs. No. 1415. 1871; *in* Ann. Mag. nat. Hist. IV **11**: 343. 1873. — *Chaetocypha pallida* (Berk. & Br.) O.K., Rev. Gen. Pl. **2**: 847. 1891.

Cyphella bloxami Berk. & Phill. *apud* Berk. & Br. *in* Ann. Mag. nat. Hist. V **7**: 129. 1881. — *Chaetocypha bloxami* (Berk. & Br.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — Type: Great Britain, Twycross (A. Bloxam, K).

Cyphella disciformis Pilát *in* Ann. mycol., Berl. **22**: 212 *pl. 1 f. 18.* 1924; not *Cyphella disciformis* P. Henn. *in* Bot. Jb. **22**: 85. 1895. — *Cyphella bloxami* var. *disciformis* (Pilát) Pilát *in* Publ. Fac. Sci. Univ. Charles No. 29: 34. 1925. — Type locality: Central Bohemia, Mnichovice.

Cyphella involuta Pilát *in* Ann. mycol., Berl. **23**: 151 *f. 6.* 1925; *in* Publ. Fac. Sci. Univ. Charles No. 29: 34 *f. 7 b.* 1925. — Type locality: Bohemia.

MISAPPLICATION.—*Cyphella ciliata* Saut. *sensu* Bourd. & G., Hym. France 161. 1928.

DESCRIPTIONS & ILLUSTRATIONS.—Pilát *in* Ann. mycol., Berl. **22**: 212 *pl. 1 f. 18.* 1924 (*Cyphella disciformis*); *in* Ann. mycol., Berl. **22**: 212 *pl. 1 f. 12a, b.* 1924 (*Cyphella bloxami*); Bourdot & Galzin, Hym. France 161. 1928 (*Cyphella ciliata*).

Fruit-body initially cup-shaped, soon disk-shaped with upturned margin, orbicular, often becoming crenulate to lobed and crisped at margin, usually about 1–2 mm in diameter, sometimes bigger, scattered or somewhat crowded, rarely a few imperfectly confluent, evenly thin throughout except the slightly thicker margin; inside even, smooth to wrinkled, from snow-white soon becoming pale yellowish-brown, of somewhat waxy appearance; outside white, minutely tomentose; texture comparable with that in *Athelia* Pers. Hyphae hyaline, not encrusted, thin-walled, rather loosely interwoven towards outside, 2.5–4 μ in diameter, without clamp-connections. Marginal hairs (close to marginal basidia) in clumps, with swollen bases and long drawn-out thinner portions which may be branched; tips obtuse; not encrusted. Hymenium non-thickening. Basidia short-clavate, plump, 12–19 × 4.5–6 μ, with (2–)4 sterigmata. Spores ellipsoid, rather elongate, often slightly amygdaliform, 6.5–9 × 3.5–5.5 μ, faintly yellowish; walls minutely but distincly roughened by punctations, non-amyloid.

On rotten bark and wood, old woody stems and fallen branches, dead herbaceous stalks, and also on rotten leaves of frondose trees. Apparently the whole year through. Europe; ? North America.

TYPE DISTRIBUTION.—Rab., Fung. europ. exs. No. 1415.

SPECIMENS EXAMINED.—GREAT BRITAIN, Batheaston, on twigs of *Clematis vitalba* (Broome; Rab., Fung. europ. exs. No. 1415; type-distribution). FRANCE, Allier, near St.-Priest-en-Murat, on rotten leaves of walnut tree (Bourd., hb. Bourd. 4725); St.-Priest-en-Murat, on oak leaves (Bourd., hb. Bourd. 4091). NETHERLANDS, Noord-Holland, 's Gravenland, Gooilust (J. Daams, L 956.312–243).

This is a very easily recognizable fungus on account of its flattened, broadly but loosely adnate fruit-bodies, with only the margin upturned and incurved (when dry). Vigorously growing fruit-bodies may become attractively crisped-lobed by proliferation along their margin. The microscopical features seem not very variable, although this would not appear from literature. The spores appear very pale coloured under the microscope and minutely but unmistakably roughened.

Cyphella pallida may be recognized from the authentic material distributed by Rabenhorst.

The discription of *Cyphella bloxami* is sufficient to justify the conclusion that it is identical with *C. pallida*. The same applies to Pilát's interpretation of *C. bloxami*. It is true that that author indicated the spores as 3 × 5 μ, which is too small. However, some error crept in on this occasion, for, according to the accompanying figure, the spores still attached to the basidia measure about 9 μ and the separately drawn spores about 6.5–7 μ, when one computes them after the magnification indicated. When Pilát (*1927:* 117) concluded that the two were conspecific (after the study of the type of *C. pallida*), he incorrectly continued to apply the later synonym as the correct name.[27]

There seems also little room left for doubt that *Cyphella disciformis* is this species. Its

[27] Due, it would seem, to the number (No. 1894) of the species in Berkeley & Broome "Notes" being taken for the date.

author regarded it as close to *C. bloxami*, but smaller, subarachnoid, and with the margin neither lobate nor crisped. Like *C. involuta* this can hardly be anything else but a not very vigorously developed growth from. The crenulation of the margins often—but not invariably—occurs in mature specimens and it seems unnecessary to keep *C. disciformis* distinct even as a variety on account of the even margin, as was done by Pilát (under *C. bloxami*).

From Pilát's description I cannot see any differences between *Cyphella involuta* and *C. pallida* either. In his French key Pilát (*1925c:* 82) emphasized "Les réceptacles régulièrement ronds [thus, as in *C. disciformis*]. Le bord incurvée dedans.", to differentiate it from *C. bloxami*. This is precisely what one finds in certain conditions of *C. pallida* and in Pilát's *C. disciformis* as well. Compare Pilát (*1924:* 212) for *C. disciformis:* ". . . margine solum involuto," and for *C. involuta* itself (*1925a:* 151) ". . . margine primo involuto, dein fere plano".

The very good description as well as the specimens in Bourdot's herbarium which I had the oppurtunity to study, show that Bourdot & Galzin's interpretation of *Cyphella ciliata* Saut. covers a small, regular form growing on fallen frondose leaves.

Corticium pezizoideum Ell. & Ev.,[28] described from the U.S.A., I know only from the original description which strongly suggests the present species except for the spores (globular, 2 μ in diameter, according to Saccardo, *1891:* 230). Rogers & Jackson (*1943:* 286) cite it as a synonym of '*Corticium centrifugum* (Lév.) Bres.' (= *Athelia epiphylla* Pers.). They indicate they had studied the type collection, but give no details. This warrants the conclusion that the spores were incorrectly described in the original description and resemble those of one of the numerous forms which they include in '*Corticium centrifugum*'. Since *Pellidiscus pallidus* does suggest orbicular fruit-bodies of *Athelia epiphylla* I wonder if *Corticium pezizoideum* might not be the present species.

I would not be surprised if *Cyphella sarothamni* Pilát (*1925a:* 149 *f. 4 A–D*) and *C. lloydiana* Pilát (*1925a:* 150 *f. 4 E–H*) were further synonyms.

The occurrence of such different substrata as are indicated above for *Pellidiscus pallidus* perhaps indicate that more than one species is involved. Romagnesi's quoted remark suggests the same. However, the available material is insufficient to decide the question but it certainly does not readily support such an assumption.

10.—CHROMOCYPHELLA De Toni & Levi

Cymbella Pat. *apud* Doass. & Pat. *in* Rev. mycol. **8**: 27. 1886; not *Cymbella* C. Agardh (1830; Cymbellaceae, Bacillariophyceae). — Monotype: *Cymbella crouani* Pat. & Doass.

Phaeocarpus Pat., Hym. Eur. 154. 1887; not *Phaeocarpus* Mart. & Zucc. (1824; Sapindaceae); ≡ *Cymbella* Pat. apud Pat. & Doass.

Chromocyphella De Toni & Levi *in* Naturalist **1888**: 158 ≡ *Cymbella* Pat. apud Doass. & Pat.

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[28] *Corticium pezizoideum* Ell. & Ev. *in* J. Mycol. **4**: 74. 1888 (n.v.); not *C. pezizoides* Pat. *in* J. Bot. (ed. Morot), Paris **5**: 314. 1891; not *C. pezizoideum* (Schw.) Schrenck *in* Bull. Torrey bot. Cl. **21**: 288. 1894.

Phaeocyphella Pat. *in* Bull. Soc. mycol. France **9**: 135. 1893 (nomen nudum); Essai taxon. Hym. 57. 1900; not *Phaeocyphella* Speg. (1909; 'Cyphellaceae'); ≡ *Cymbella* Pat. apud Doass. & Pat.

? *Phaeocyphella* Speg. *in* An. Mus. nac. Hist. nat. Buenos Aires **19** (= III **12**): 278. 1909; not *Phaeocyphella* Pat. (1900; 'Cyphellaceae'). — Monotype: *Phaeocyphella sphaerospora* Speg.

Fruit-body solitary, cup- to disk-shaped (–3 mm in diameter), abruptly contracted into a stalk-like base, or sessile; outside white to pale, minutely silky-pubescent (from rather undifferentiated hyphae); margin straight, not typically incurved when dry; inside even to wrinkled, white, becoming dusted cinnamon- to reddish brown by the spores. Hyphae radially arranged, looser towards outside, compactly arranged towards inside, thin-walled; clamp-connections present. Basidia when young elongated ovoid or pear-shaped, when mature cylindrical-club-shaped with stalk-like base, medium-sized (20–25 μ long); sterigmata 4, conical, curved, rather stout (–10 μ long). Spores globular (at first broad-ellipsoid, often somewhat irregular in outline), medium-sized (7–10 μ in diameter), reddish brown; wall coloured, asperulate to minutely spiny, non-amyloid.

On mosses on bark. Temperate northern regions; perhaps also elsewhere (South America, Java).

MONOTYPE.—*Cymbella crouani* Pat. & Doass. apud Pat.

EXAMPLES.—*Chromocyphella muscicola* (Fr.) Donk, *Phaeocarpus floccosus* Maire, *Phaeocyphella sphaerospora* Speg.

The muscicolous fruit-body and the distinctly coloured and at the same time roughened and nearly globular spores sharply characterize this genus. Perhaps the basidia offer an additional feature of importance in being obovoid-ellipsoid to pear-shaped when young and notably elongating when reaching maturity in the one species studied. The outside of the fruit-body does not bear typical 'hairs'.

By the characters of the spores, *Chromocyphella* is easily distinguished from another muscicolous genus, *Leptotus* P. Karst. *sensu stricto* = *Leptoglossum* P. Karst. in part. In the latter genus the spores (wall or oil-drop) may be faintly tinged yellowish or brownish, but their colour is much less pronounced (spore-powder not distinctly coloured) and their surface smooth. Moreover the basidia in *Leptotus* show nothing unusual and are club-shaped when young, retaining their shape upon further development. I do not have the impression that the two genera are closely related.

Chromocyphella (*Phaeocyphella*) has become a receptacle for species of 'Cyphellaceae' with coloured spores, without regard to other features. Patouillard (*1900:* 57) set the example in this respect. Others transferred additional species to the genus, even if the colour of the spores was very faint. The components that in this way drifted into the genus formed a very heterogeneous collection. Some of these are congeneric with *Cyphella endophila* Ces., and if in its turn this species is congeneric with *Phaeosolenia platensis* Speg. (as I suspect from the description) then this group may be set apart under the generic name *Phaeosolenia* Speg. Such a genus would differ from *Chromocyphella* in a restricted sense by its characteristic hairs at the outside (patent, rather short, heavily encrusted by easily detersile crystals of lime-oxalate) and the more elongate, smooth, somewhat thick-walled spores. Still other species are referable to *Leptotus* (*Leptoglossum*), *Pellidiscus* Donk (see p. 89), or have no suitable described genus to receive them (*Cyphella fraxinicola* Berk. & Br.).

The colour of the spores, which appears an important generic feature in both *Chromocyphella* and *Phaeosolenia* (in the above sense), does not mean much in some other genera of the 'Cyphellaceae'. This is particularly true for *Cyphellopsis* [type species, *Solenia anomala* (Pers. per Fr.) Fuck.]. In that genus all shades are represented between rather distinctly brown-coloured to strictly colourless spores.[29] Some species of the *Leptotus* complex have just sufficiently coloured spores to account for their transfer to *Chromocyphella*. Emphasis on the colour of the spores alone has proven to be conducive to artificial genera in the 'Cyphellaceae'.

Romagnesi (*1950*) compared the spores of this genus with those of *Galerina* Earle [*Galera* (Fr.) Kummer *pro parte*]: "périspore, verrues, plage hilaire limitée, couleur rouille par ammoniaque".

In the more elaborate paper on the same subject the following remarks appear: —

". . . Nous n'avons malheureusement recueilli vivante aucune espèce [du genre *Phaeocyphella*], mais les exemplaires qui figurent dans l'Herbier Bourdot sous le nom de *Phaeocyphella muscicola* (Fr.) sensu Rea (det. C. Cool, leg. Schweers) et *Ph. muscigena* Fr., nous ont montré des spores fort semblables à celles des *Galerina* par leur couleur jaune un peu rouillé (surtout dans l'ammoniaque, mais la réaction n'est pas aussi nette que chez les dernières), leur périspore membraneuse recouvrant des verrues obtuses probablement épisporiques, leur plage supra-hilaire nettement limitée et nue, ou moins ornée, leur endospore très nettement colorée. Or, ces caractères, ou plus précisément leur conjunction, sont particuliers aux Agaricales, et ne se retrouvent chez aucune Aphyllophorale, du moins à notre connaissance; ils sont au contraire courants chez de nombreuses Naucoriacées, et permettent donc d'envisager certains rapports entre *Phaeocyphella* et Agarics chromosporés. En outre, l'habitat muscicole de *Ph. muscigena* se retrouve chez un nombre important de *Galerina*."—Romagnesi (*1953:* 409–410).[30]

This is a very interesting suggestion indeed which seems also supported by the shape of the basidia as indicated above and by the association with mosses. If Romagnesi's suggestion proves to be acceptable, one will hardly be able to imagine two more dissimilar but related genera than *Galerina* and *Chromocyphella*. It would also be in line with my contention that *Leptotus* is widely different, it being related to another series of agarics.

The genus was founded for a single species which is still its best known member, viz. for *Cyphella abieticola* Crouan = *Cymbella crouani* Pat. & Doass. = *Cyphella muscicola* Fr. as I interpret that species (see below). The original name *Cymbella* appeared to be pre-empted and it was therefore changed by Patouillard into *Phaeocarpus* (also preoccupied) and *Phaeocyphella*. The latter name is the one now in use but it is incorrect because of an earlier synisonym, *Chromocyphella* (cf. Donk, *1951:* 209). For some time the nomenclatorial Rules forced Maire (*1917:* 154) to consider *Phaecarpus* Pat. as the correct name because its earlier hononym was considered a synonym.

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[29] As found in spores that have remained on the disk rather than in spore-prints.

[30] In a collection from Java which I consider to belong to *Chromocyphella*, but in which the fruit-bodies do not yield any distinct basidia (although there are copious spores), I found that in quite a number of the spores an indistinct germ-pore was present (of the kind also seen in many species of *Galerina*).

Chromocyphella muscicola (Fr.) Donk, *comb. nov.*

Cyphella muscicola Fr., Syst. mycol. **2**: 202. 1822, exclusive of varieties. — *Calyptella muscicola* (Fr.) Quél., Ench. Fung. 217. 1886. — *Arrhenia muscicola* (Fr.) Quél., Fl. mycol. France 33. 1888. — *Chaetocypha muscicola* (Fr.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — *Phaeocyphella muscicola* (Fr.) Rea, Brit. Bas. 704. 1922.

? *Cantharellus tenuissimus* Saut. *in* Flora, Jena **24** (I): 317. 1841. — *Cyphella tenuissima* (Saut.) Saut. ("in litt."), Rab., Krypt.-Fl. **1**: 315, 1844 (as a synonym); Saut. *in* Mitt. Ver. salzburg. Landesk. **6**: 44. 1866 (n.v.), — Type locality: Austria, Salzburg, Ober-Pinzgau, near Mittersill.

Cyphella abieticola Crouan, Fl. Finist. 61. 1867; not *C. abieticola* P. Karst., Fungi Fenn. exs. No. 718. 1868. — Type locality: France, Finistère.

Cymbella crouani Pat. & Doass. *apud* Doass. & Pat. *in* Rev. mycol. **8**: 27. Jan. 1, 1886 (nomen nudum); *apud* Pat., Tab. anal. Fung. **1**: 204 *f.* 467. 1886. — *Phaeocarpus crouanii* (Pat. & Doass. apud Pat.) Pat., Hym. Eur. 154. 1887 (without reference or description). — *Cyphella crouanii* (Pat. & Doass. apud Pat.) Sacc., Syll. Fung. **6**: 672. 1888. — *Chaetocypha crouanii* (Pat. & Doass. apud Pat.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — *Phaeocyphella crouanii* (Pat. & Doass. apud Pat.) Pat., Essai taxon. Hym. 58. 1900. — *Calyptella crouanii* (Pat. & Doass. apud Pat.) Big. & Guill., Fl. Champ. sup. France, Compl. 481. 1913 ≡ *Cyphella abieticola* Crouan.

Cyphella fuscospora Currey ("in Herb.") *ex* Cooke *in* Grevillea **20**: 9. 1891. — *Phaeocyphella fuscospora* (Currey ex Cooke) Rea, Brit. Bas. 704. 1922. — Type locality: Great Britain, Weybridge.

Misapplications.—*Cantharellus galeatus* (Schum.) *per* Fr. *sensu* Fr., Epicr. 567. 1838 (*Cyphella*); Quél., Fl. mycol. France 33. 1888 (*Arrhenia*); Bourd. & G. *in* Bull. Soc. mycol. France **26**: 227. 1910 (*Phaeocyphella*).

DESCRIPTIONS & ILLUSTRATIONS.—Patouillard, Tab. anal. Fung. **1**: 204 *f.* 467. 1886 (*Cymbella crouanii*); Bourdot & Galzin *in* Bull. Soc. mycol. France **26**: 227. 1910 & Hym. France 165. 1928 (*Phaeocyphella galeata*); Burt *in* Ann. Missouri bot. Gdn **1**: 362. 1914 & **13**: 316. 1926 (*Cyphella galeata*); Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 132. 1931 (*Phaeocyphella galeata*).

TYPE LOCALITY.—Sweden.

Cyphella muscicola Fr. has been diversely interpreted. However, the original description is (except for the lack of microscopical details) ample for its time and quite sufficient, I believe, to conclude that the name covers the fungus now often called *Cyphella galeata* (Schum. per Fr.) Fr. and *Cymbella crouani*. (For the latter species the generic name *Cymbella*, ≡ *Chromocyphella*, was introduced.) Especially the words, "Intus e sporidiis brunneis, leviter pruinosa. Nascitur ad muscos vivos supra arborum truncos vetustos" appear decisive. They indicate, for instance, that *Cyphella muscicola* is q u i t e d i s t i n c t l y brown-spored, and that the species is associated in the first place with bark-inhabiting mosses. They exclude convincingly the species of *Leptotus* to which the name *Cyphella muscicola* has sometimes been applied, for instance, by Fries himself in 1838: the spores of these species, which, moreover, prefer bigger and terrestrial mosses, are too faintly coloured for Fries to have been able to see with a handlens as a brown powder.

This conclusion excludes, *inter alia*, the following species of *Leptoglossum* (*Leptotus*) to which the name *Cyphella muscicola* has been misapplied. They are smooth-spored.

(i) *Sensu* Patouillard, Tab. anal. Fung. **1**: 19 *f.* 31. 1883; Bourdot *in* Bull. Soc. mycol. France **48**: 209. 1932 (*Phaeocyphella*); Donk *in* Meded. Nederl. mycol. Ver.

18–20: 131. 1931 (*Cyphella*), with almost globular, rather small spores (4.5–6 × 4–5 μ).

(ii) *Sensu* Pilát *in* Ann. mycol., Berl. **23**: 163 *f. 16.* 1925 (*Phaeocyphella*), with more definitely ovoid and bigger spores (8–9 × 5.5–6 μ).

(iii) *Leptoglossum* (*Leptotus*) *retirugum* (Bull. per Fr.) P. Karst.

The specific delimitations between these three fungi have not yet been satisfactorily worked out.

The description of *Cantharellus tenuissimus* suggests the present species rather than one of these species of *Leptoglossum* with only faintly coloured spores: ". . . intus brunnescens . . . innen zuerst grau, dann braun." The other details bear out this assumption, but Sauter's account is too poor to be decisive. There is no type preserved (cf. von Keissler, *1917:* 107).

Cyphella abieticola Crouan is readily recognizable from the original account. The name was changed by Patouillard into *Cymbella crouani* because of the existence of a homonym—of later date. The description of *C. abieticola* is rather good for its time and states, *inter alia*, ". . . hymenium ochracé formé par des basides claviformes, stérigmates longs, spores rondes ochracées granuleuses . . .." Patouillard's description and figure, too, leave no doubt about the identity of the fungus he had in mind, a conclusion that has been verified by a study of his specimens, of which he wrote, "spores sphériques (7–9 × 6) finement échinulées, ocracées-rousses".

Another name that may be listed as a synonym, on the basis of the original description, is *Cyphella fuscospora:* "sporulis fuscis, subglobosis vel subellipticis, punctulatis vel granulato-echinulatis (8–10 μ long.)." Yet, it should be pointed out that the fruit-bodies are very small in this case, 0.20–0.25 mm, thus of about the same dimensions as indicated for *Cyphella chromospora* Pat. (which I do not know).

Phaeocyphella muscicola (Fr.) Rea *sensu* Rea, Brit. Bas. 704. 1922 offers some difficulties. The description of the outer features corresponds closely to Fries's description, which may have been adapted and then amplified with, "Hymenium white then grey . . .. Spores pinkish, or pale brown, subglobose, 8–10 μ." It is possible that Rea described another species of *Chromocyphella* but it may also be that the microscopical details added were taken from a young fruit-body in which the spores were not yet plentiful and not completely matured, the colour being paler and the walls probably still smooth.

In this connection it should be pointed out that Romagnesi (*1950*) distinguishes between two species, viz. (i) "*Phaeocyphella muscicola* ss. Rea: spore de *Galerina* (périspore, verrues, plage hilaire limitée, couleur rouille par ammoniaque)" and "*Phaeocyphella galeata:* même spore, mais ronde." One would conclude that the first of these has more or less ellipsoid spores, which, however, hardly agrees with Rea's description. I have studied several collections of the present genus from Europe but invariably found the spores not exactly globular but varying from globular to short-ellipsoid on the same fruit-body.

For other species that might or might not be different from *Chromocyphella muscicola*, see below.

Chromocyphella muscicola has often been identified with *Cyphella galeata* (Schum. per Fr.) Fr. (*Cantharellus galeatus* Schum.) In the absence of type material this fungus must be interpreted only from its original description and later published corresponding figure. From the description it emerges as a somewhat smaller fungus than fully developed *Leptoglossum* (*Leptotus*) *retirugum*, with the hymenial surface obsoletely veined radially and presumably without cross-veins. The picture that represents the type (Flora danica, *pl. 2027 f. 1*; reproduced by Burt, *1914: pl. 19 f. 2*) strongly supports the thesis that it belongs to *Leptoglossum* (*Leptotus*). What the correct application of the name may be will not now be discussed, but one conclusion is certain, in my opinion: *Cyphella galeata* does not belong to *Chromocyphella*. Confusion with the latter genus started when Fries (*1838:* 567) thought he had found the species himself and ascribed to it a hymenium which turns brown. This has been interpreted as indicative of brown spores and resulted in the identification with *Chromocyphella muscicola* by certain authors (Quélet, Bresadola, Bourdot & Galzin, Burt, and others).

Other species of Chromocyphella

Chromocyphella muscicola is the only more generally known species of the genus. Yet it seems that there may be a few more: they are recognizable from their descriptions as apparently closely related, and may be conspecific.

Phaeocarpus floccosus Maire *in* Bull. Soc. Hist. nat. Afr. Nord **8**: 154. 1917. — Type locality: "Mauretania".

The original description suggests a species related to, but distinct from, *Chromocyphella muscicola*, of smaller size (0.3–0.8 mm in diameter); with smaller basidia (14–17 × 5–5.5 μ); and spores, "ellipsoidales-pruniformes, subapiculées à la base, couleur de miel sous le microscope, verruqueuses, 6–7 × 3–5 μ", thus of different shape and size.

Phaeocyphella sphaerospora Speg. *in* An. Mus. nac. Hist. nat. Buenos Aires **19**: 278. 1909. — Type locality: Argentine, Santa Catalina near Buenos Aires.

The rather ample description agrees on the whole with *Chromocyphella muscicola*; however, the hairs at the outside are stated to be minute, 25–75 × 5 μ, and the sterigmata, to be short.

II.—LACHNELLA Fr. emend.

Lachnella Fr., Fl. scan. 343. 1835; cf. Sing. *in* Lilloa **22**: 343. "1949" [1951]. — *Chaetocalathus* sect. *Lachnella* (Fr.) Locq. *in* Bull. Soc. mycol. France **68**: 165. 1952.

Lachnium Clem. *in* Univ. Stud. Nebraska **3** (1): 73. 1902 (nomen nudum); not *Lachnium* Retz. per P. Karst. 1871 (Hyaloscyphaceae, Ascomycetes); ≡ *Lachnella* Fr.

Cyphella subgen. *Crustotricha* Pilát *in* Ann. mycol., Berl. **23**: 152. 1925; *in* Publ. Fac. Sci. Univ. Charles, Prague No. 29: 43. 1925. — Type (selected): *Cyphella alboviolascens* (A. & S. per Pers.: Fr.) Crouan.

Fruit-bodies scattered, often gregarious but not crowded over considerable areas, sessile (slightly contracted at base), centrally attached, –1–2 mm in diameter; cup-shaped, when dry globular to pear-shaped, not or hardly longer than wide; margin inrolled and mouth (nearly) closed when dry; inside even, cream- or brightly coloured; outside silky by a coating of appressed hairs, white. Substance thin-membranous, thickest at centre (disk from concave to almost flattened), tough, somewhat fleshy at inside (which may dry hard). Hairs appressed, cylindical, with blunt tip, asperulate, not septate, colourless, rather thick-walled; in KOH solution becoming very thick-walled with narrow lumen at least below, often deformed over short to considerable stretches (swollen, very transparent, surface smooth because of fading asperulation, lumen thread-like or disappearing); somewhat pseudo-amyloid. Spindle-shaped 'basidioles' may be present. Basidia rather large (40–75 μ long), in one species (*L. tiliae*) at centre of fruit-body even very long-drawn towards base (–175 μ long); sterigmata 2–4, conical, curved, rather stout (about 10 × 3–4.5 μ). Spores obovate, ellipsoid, swollen below middle (usually somewhat triangular in outline), adaxially flattened, rather large (10–20 μ long), colourless; wall smooth, non-amyloid.

On branches and herbs. Northern & southern temperate zones, apparently rare in the tropics.

HOLOTYPE.—*Peziza alboviolascens* A. & S. per Pers.: Fr. — Cf. Donk (*1951:* 212).

EXAMPLES.—*Lachnella alboviolascens* (A. & S. per Pers.) Fr., *L. villosa* (Pers. per Fr.) Gillet, *L. tiliae* (Peck) Donk apud Sing.

The hairs have a roughened surface by some kind of innate incrustation (rather than by detersile lime-oxalate crystals) and become more or less notably altered in KOH solution: the walls become thicker, often leaving only a capillary lumen, and at irregular places excessively swollen. In these strongly deformed parts, the surface asperulation has disappeared and the lumen has become either a mere thread or usually has vanished completely. This type of deformation I did not come across in any other group of 'Cypellaceae', except to a much slighter degree in *Cyphella jucundissima* (Desm.) Höhn., which I believe to form an independent genus.

In the above circumscription *Lachnella* is a clear-cut genus easily recognized among the 'Cyphellaceae' by the combination of the following characters: hairs appressed, with innate asperulation, more or less thick-walled, colourless and remaining colourless in KOH solution in which the walls become thicker and considerable portions become swollen and deformed; hymenial elements big, spores 10–20 μ long; spores more or less typically widest below middle. *Cyphellopsis* [type species, *Solenia anomala* (Pers. per Fr.) Fuck.] agrees in many respects. At first (and before being aware of the correct application of the name *Lachnella*), I combined the *Solenia anomala* group and the *Cyphella alboviolascens* group into the single genus *Cyphellopsis*, but soon concluded that *Cyphellopsis* may be kept apart generically because of the colour of the hairs (brown and somewhat darkening in KOH solution) and the fact that these hairs undergo neither any considerable transformation nor deformation in KOH solution. There is one species of *Cyphellopsis* that shares with *Lachnella* the big basidia and spores. For the present I still believe the two genera as closely related.

When I told Dr. R. Singer in 1946 that I was thinking of a close relation between *Lachnella* and *Chaetocalathus* Sing. and *Crinipellis* Pat., he at once convinced himself

that the hairs in *Lachnella* were also pseudo-amyloid as in the two other genera, a condition he had described on a previous occasion as follows:—

". . . the hairs . . . are colorable with iodine (Melzer's reagent), where they turn dark rufous-bay, or sometimes almost violet (the latter reaction being very close to 'amyloid'). It is very important for a satisfactorily effect to treat the preparations previously with ammonia. The pseudoamyloid to almost amyloid hairs are found only in *Crinipellis* and *Chaetocalathus*. Beside, those hairs are mostly very long without any septa, and even if they are septate they are not or only exceptionally constricted at the septa."—Singer (*1942:* 444).

The same conclusion was reached by Romagnesi:—

"Chez *Cyphella villosa* . . . les poils extérieurs de la cupule . . . sont puissamment métachromatiques, et il suffit d'une infime quantité de Bleu de Crésyl dissous dans l'eau pour les voir devenir d'un rouge intense et franc (à la lumière du jour): la coloration prise est si vive qu'elle résiste même très longtemps à l'action de l'ammoniaque! En outre, après lavage à l'ammoniaque, ils se montrent faiblement, mais incontestablement pseudo-amyloïde, et, par ces deux charactères, ils se rapprochent donc beaucoup de ceux des *Chaetocalathus* (surtout *C. Craterellus*). . . ." —Romagnesi (*1953:* 408).

The similarity between *Chaetocalathus* and *Lachnella* is in many respects striking indeed. The former genus was separated from *Crinipellis* because of the sessile and dorsally attached caps (stalked in *Crinipellis*) which often become globular when drying. "It is obvious", Singer (*1951:* 344) remarks, "that *Lachnella* is closest to *Chaetocalathus* which differs in the well developed hymenophore and smooth epicuticular hairs; also in the presence of pseudoamyloid cystidia or spores. A similar type of echinulate hairs [as is found in *Lachnella*] is not found in the whole Marasmiinae-series but can be recognized in the cortical hairs of such Mycenas as *Mycena osmundicola*." (In my opinion the 'echinulation' in *Lachnella* is of a different type from that in the Mycenas mentioned.)

Further, the occurrence of spindle-shaped basidioles (occurring abundantly at least in one species) of the type depicted for *Marasmius rotula* (Scop. per Fr.) Fr. and *M. androsaceus* (L. per Fr.) Fr. by Kühner (*1933:* 65 *f. 1, pl. 7 fs. 1, 4, 5*) should not pass unnoticed. Such basidioles of the "*Collybia-Marasmius*-type" (Singer *1951:* 344) are not only found in many species of *Marasmius* Fr. but are also found in *Crinipellis*, where they seem of general occurrence (Singer, *1942:* 447).

Locquin (*1952:* 165–166) even goes a step further and proposes to combine the two genera under the name *Lachnella:*—

". . . si les filaments cuticulaires sont lisses dans l'un et échinulés dans l'autre, il ne s'agit pas de vraies échinulations, mais d'un précipité de microcristaux de sulfate de calcium plus ou moins empâtés dans la membrane. Ceci explique leur achromatisme dans tout colorant et spécialement vis à vis des réactifs iodés. Cet empâtement de cristaux se retrouve dans la paroi des cystides de la section *Holocystis* Singer de *Chaetocalathus*."

Moreover, Locquin (*1952:* 169) expresses his doubt about the practical value of the pseudoamyloid reaction, especially on the generic level. Without entering

into a discussion on the latter question and only briefly remarking that the nature of the surface of the hairs in *Lachnella* seems not adequately explained by Locquin, I would remark that there are quite an imposing number of differences between the two genera, which are sufficient to keep them separate: lamellate hymenophore in *Chaetocalathus*, different behaviour of the hairs in KOH solution, different surface of the hairs, bigger basidia and spores as well as a characteristic shape of the spores in *Lachnella*.

Locquin not only combines *Chaetocalathus* and *Lachnella*, he also throws in *Merismodes* (cf. Singer, *1951:* 345). I am again unable to follow Locquin but a discussion will be reserved to a future occasion after *Merismodes* has been treated in the present series of notes.

It might well be that *Lachnella* is related to a species that has been described under the name of *Kordyana cyphelloides* Viégas (*1945:* 253 *textpl. 1*). This species certainly does not belong to *Kordyana* Racib. (Exobasidiaceae), but seems rather the type of a new genus. From the appearance of its fruit-body under low magnification it resembles *Wiesnerina* (see p. 45), but the hairs form a kind of calyx-like peridium around the disk and thus are evidently not homologous with the cystidia arising throughout the disk in *Wiesnerina*. These hairs are thick-walled, hyaline, and asperulate; the basidia and spores are rather big (28–42 × 10–12 μ and 14–16 × 7–8 μ); and the spores are somewhat triangular, broadest below the middle. However, the hairs rather gradually taper upwards and the fruit-body breaks through the epidermis of living leaves, a situation not matched by any form of *Lachnella*.

According to Maire (*1902:* 101) *Cyphella villosa* has chiastic basidia.

The reintroduction of the name *Lachnella*, previously universally in use for variously circumscribed groups of Discomycetes, became necessary by the lack of support for a generally acceptable proposal for conservation of a discomycetous genus of that name. Donk (*1951:* 212) explained its present use for a genus of basidiomycetes which has already been accepted by Singer (*1951:* 343).

LACHNELLA ALBOVIOLASCENS (A. & S. per Pers.: Fr.) Fr.

Peziza sessilis Sow., Col. Figs Engl. Fungi *pl. 389 f. 1.* 1803 (devalidated name). — *Peziza sessilis* Sow. *per* Purt., App. Middl. Fl. 466. 1821. — *Dasyscyphus sessilis* (Sow. per Purt.) S. F. Gray, Nat. Arr. Brit. Pl. **1**: 671. 1821. — Type locality: Great Britain.

Peziza nivea Schum., Enum. Pl. Saell. **2**: 435. 1803 (devalidated name); not *P. nivea* Dicks., Fasc. Pl. crypt. Brit. **1**: 21. 1785 (devalidated name) *per* Purt., App. Midl. Fl. 456. 1821; not *P. nivea* Batsch, Elench. Fung. 117. 1783 *per* Pers., Mycol. europ. **1**: 295. 1822; not *Peziza nivea* (Hedw. f.) *per* Fr., Syst. mycol. **2**: 90. 1822. — Type locality: Denmark, Sjaelland. — Fide Fr., Syst. mycol. **2**: 96. 1822 = *Peziza alboviolascens* ["!"].

Peziza alboviolascens A. & S., Consp. Fung. nisk. 322 *pl. 8 f. 4.* 1805 (devalidated name). — *Peziza fallax* var. *alboviolascens* (A. & S.) *per* Pers., Mycol. europ. **1**: 266. 1822. — *Peziza alboviolascens* (A. & S. per Pers.) Schw. *in* Schr. naturf. Ges. Leipz. **1**: 120. 1822; Fr., Syst. mycol. **2**: 96. 1822; Berk. *in* J. E. Sm., Engl. Fl. **5** (2): Index p. x. 1836 ("*alboviolacea*", correct on p. 196). — *Lachnella alboviolascens* (A. & S. per Pers.: Fr.) Fr., Summa Veg. Scand. **2**: 365. 1849; P. Karst., Fung. Fenn. exs. No. 329. 1866. — *Cyphella alboviolascens* (A. & S. per Pers.:

Fr.) Crouan, Fl. Finist. 61. 1867; P. Karst., Fung. Fenn. exs. No. 715. 1868. — *Chaetocypha alboviolascens* (A. & S. per Pers.: Fr.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — *Cyphellopsis alboviolascens* (A. & S. per Pers.: Fr.) Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 129. 1931.

Peziza fallax Pers., Mycol. europ. **1**: 266. 1822; not *P. fallax* Desm. *in* Ann. Sci. nat. (Bot.) III **3**: 367. 1845. — Type locality: Europe, perhaps France; lectotype, L 910.261–947.

Peziza velutina Desm., Cat. Pl. om. 14. 1823; not *P. velutina* St.-Am., Fl. agen. 531. 1821; not *P. velutina* Wallr., Fl. crypt. Germ. **2**: 487. 1833. — *Peziza alboviolascens* var. *velutina* (Desm.) Duby, Bot. gall. **2**: 1045. 1830. — Type: France, near Lille [Desm.; cf. hb. Fr.-UPS, K, & type-distribution (?) in Desm., Pl. Crypt. Nord France No. 17]. — Fide Fr., Elench. **2**: 9. 1828 = *Peziza alboviolascens* (forma).

[*Peziza alboviolascens* b. alba: Fr., Elench. **2**: 9. 1828 ('alba' not an epithet but a one-word description). —] *Peziza alboviolascens* var. ("b.") *alba* Desm., Pl. crypt. Nord France No. 119. 1826. — *Cyphella alboviolascens* var. *alba* (Desm.) Roum., Fungi gall. exs. No. 2915. 1884. — Type (selected): same as of *Peziza velutina* Desm.

Ascobolus vitis Wallr. ("ined."); Fr., Elench. **2**: 9. 1828 (as a synonym). — Specimen: Germany, presumably Thüringia (hb. Fr.-UPS). — Fide Fr., l.c. = *Peziza alboviolascens*.

? *Peziza vitis* Schw. *in* Trans. Amer. phil. Soc. II **4**: 173. 1832. — *Trichopeziza vitis* (Schw.) Sacc., Syll. Fung. **8**: 429. 1889. — Type locality: U.S.A., Pennsylvania, Bethlehem.

Peziza syringea Wallr., Fl. crypt. Germ. **2**: 455. 1833. — *Trichopeziza syringea* (Wallr.) Fuck. *in* Jb. nassau. Ver. Nat. **29–30**: 31. 1875. — *Cyphella syringea* (Wallr.) Cooke *in* Grevillea **20**: 9. 1891 ("*syringae*"). — Type locality: Germania, Thüringia.

Peziza ornata Saut. *in* Flora, Jena **24**: 309. 1841. — *Lachnella ornata* (Saut.) Saut. *in* Mitth. Ver. salzburg. Landesk. **6**: 49. 1866 (n.v.). — Type locality: Austria. — Fide Wint. *in* Hedwigia **20**: 130. 1881 & Keissl. *in* Ann. naturh. Hofmus., Wien **31**: 98. 1917 = *Cyphella alboviolascens*.

Myriothecium vitis Bon., Handb. allgem. Mykol. 243 *pl. 10 f. 215*. 1851. — *Volutella vitis* (Bon.) Sacc., Syll. Fung. **4**: 688. 1886. — *Cyphella vitis* (Bon.) Höhn. ("in litt.") *apud* Sacc. & D. Sacc. *in* Sacc., Syll. Fung. **17**: 192. 1905. — Type locality: Germany.

Cyphella curreyi Berk. & Br. *in* Ann. Mag. nat. Hist. III **7**: 379. 1861 & *in* Rab., Fungi europ. exs. No. 416. 1862 (with description). — Type & type distribution: Great Britain, Batheaston (Broome, K, & in Rab., Fungi europ. exs. No. 416). — Fide P. Karst. *in* Bidr. Känn. Finl. Nat. Folk. **25**: 322. 1876 & Talbot *in* Bothalia **6**: 471, 472. 1956 = *Cyphella alboviolascens*.

Lachnella alboviolascens f. *caraganae* P. Karst., Fung. Fenn. exs. No. 329. 1866 (nomen nudum). — Type distribution: Finland, Mustiala (P. Karst., Fung. Fenn. exs. No. 329).

Corticium dubium Quél. *in* Mém. Soc. Emul. Montbéliard II **5**: 444 *pl. 1 f. 10*. 1875. — *Cyphella dubia* (Quél.) Quél. *in* Bull. Soc. bot. France **25**: 290. 1879 (in obs. to *C. villosa*). — *Cyphella alboviolascens* var. *dubium* (Quél.) Krieger, Fung. saxon. exs. No. 1807. 1904. — Type: "Gallia austr.-orient." (Quél., hb. Fr.-UPS). — Fide Quél., Fl. mycol. France 27. 1888 = *Cyphella alboviolascens*.

Cyphella stuppea Berk. & Br. *in* Ann. Mag. nat. Hist. V **1**: 25. 1878; Sacc., Syll. Fung. **6**: 675. 1888 ("*stupea*"). — *Chaetocypha stuppea* (Berk. & Br.) O.K., Rev. Gen. Pl. **2**: 848. 1891 ("*stupea*"). — Monotype: Great Britain, Scotland, Menmuir (M. L. Anderson, K).

Cyphella pezizoides Zopf *in* Zopf & P. Syd., Mycoth. march. No. 1. 1879 (with description and figure). — Type distribution: Germany, near Berlin, Kreuzberg (Zopf, in Zopf & P. Syd., Mycoth. march. No. 1).

Cyphella villosa var. *lutescens* Roum., Fungi gall. exs. No. 1810. 1882 (nomen nudum). — *Cyphella villosa* f. *lutescens* (Roum.) *ex* Roum. *in* Rev. mycol. **5**: 142. 1883 (reference to description in Rev. mycol. **4**: 20, foot-note). — Type distribution: France, Nimes (Roum., Fungi gall. exs. No. 1810).

[*Peziza alboviolascens* f. alba Fr., Elench. **2**: 9. 1828 ('alba' not an epithet but a one-word

description). —] *Cyphella alboviolascens* f. *minuscula* Roum., Fung. gall. exs. No. 1906. 1882 (reference, "*P. Alb.* v. β. alba Fr. El. —"); *in* Rev. mycol. **4**: 23. 1882 (name only). — Type (selected): same as of *Peziza velutina* Desm. and *Peziza alboviolascens* var. *alba* Desm.

Cyphella villosa f. *solani* P. Syd., Mycoth. march. No. 1233. 1886 (without description). — Type distribution: Germany, near Berlin, Lichterfelde (P. Syd., Mycoth. march. No. 1233).

Cyphella villosa f. *sambuci* P. Syd., Mycoth. march. No. 1806. 1887 (without description). — Type distribution: Germany, near Berlin, Thiergarten (P. Syd., Mycoth. march. No. 1806).

MISAPPLICATION?—*Sphaeria tomentosa* Relh. *per* Purt. *sensu* Purt., App. Midl. Fl. 287 (in obs. on p. 288). 1821.

DESCRIPTIONS & ILLUSTRATIONS.—Fries, Syst. mycol. **2**: 96. 1822 (*Peziza*; with exclusion of var. β); Karsten *in* Bidr. Känn. Finl. Nat. Folk **25**: 322. 1876 (*Cyphella*); Burt *in* Ann. Missouri bot. Gdn **13**: 315. 1926 (*Cyphella*); Bourdot & Galzin, Hym. France 159. 1928 (*Cyphella*); Donk *in* Meded. Nederl. mycol. Ver. **18–20**: 129. 1931 (*Cyphellopsis*).

Hairs very much as in *Lachnella villosa*, about 200 × 5–6 μ. Basidia 60–75 × 12–16 μ, with 2–4 sterigmata of about 10 μ long, 4–4.5 μ wide at base. 'Basidioles' absent or at least not a conspicuous hymenial element. Spores broad-inversed-ovoid, adaxially somewhat flattened, 13.5–15.25 × 9–12 μ with distinct, blunt, excentric apiculus; contents granular.

TYPE LOCALITY.—Germany, Oberlausitz. Type: "*Peziza albo-violascens* nobis" (L 910.261–8; Persoon added, "Alb. et Sweinitz").

SOME SPECIMENS EXAMINED.—Type, cited above, and several collections mentioned below in the discussion and other ones, inclusive of the types or portions of the types of *Peziza fallax* Pers., *P. velutina* Desm. (*Peziza alboviolascens* var. *alba* Desm., *Cyphella alboviolascens* f. *minuscula* Roum.), *Ascobolus vitis* Wallr., *Corticium dubium* Quél., *Cyphella stuppea* Berk. & Br.; and one or more copies of the type-distributions of *Cyphella curreyi* Berk. & Br., *Cyphella villosa* var. *lutescens* Roum., *Lachnella alboviolascens* f. *caraganae* P. Karst., *Cyphella pezizoides* Zopf, *Cyphella villosa* f. *solani* P. Syd., *Cyphella villosa* f. *sambuci* P. Syd.; &c.

For differences from *Lachnella villosa*, see that species.

It would seem that the colour of the disk is variable. In most cases it becomes dark at least when drying and in the herbarium the disk is seen as a dark ring shining through the hairy covering in flattened and pressed fruit-bodies. However, more or less luxurious and proliferous fruit-bodies may lack any indication of the purplish colour and the disk may remain pallid, yellowish (*Peziza fallax* Pers.).

The identity of *Peziza alboviolascens* A. & S. has never been seriously questioned. Its current application is supported by a specimen sent to Persoon by the authors of the species (as cited above as type). It still shows a very few fruit-bodies typical of the present species. (I did not examine any microscopically.) The specimen should be considered type as long as other 'authentic' material has not been located. There is also a specimen marked in Persoon's handwriting "*Peziza albo-violascens*, Alb. et Sweinitz." (L 910.261–6) which may also have been sent by the authors of the name but was kept separately because it grew on a different substratum. The fruit-bodies in this case have become covered by glue when the piece of bark was pasted to the sheet; nevertheless these fruit-bodies are also recognizable as *P. alboviolascens*. (Not examined microscopically.)

Persoon introduced the name *Peziza fallax* for the present species apparently because he thought the name *P. alboviolascens* not completely appropriate for the species as a whole. For him typical specimens were "intus pallescens" and of *P. alboviolascens* he made a variety (β), "intus caesia vel violascens". As is explained above such a difference is irrelevant. A fine set of specimens in Persoon's herbarium fixes the identity of *P. fallax* (L 910.261–953, 910.261–959, 910.261–946 & –947). An exception is L 910.261–952, "*Peziza fallax*. Myc." (written by Persoon), which I would refer to *Lachnella villosa*. The substratum of this specimen seems to be an umbelliferous stalk. I have chosen L 910.261–947 as type; it is labelled in Persoon's handwriting, "*Peziza fallax*, Mycol. Europ." Moreover, there is a specimen in the Herbarium at Kew which was named *P. fallax* by Persoon.

Peziza sessilis Sow. has usually been listed as a synonym of *Lachnella villosa* in agreement with Fries (*1822:* 114), but in my opinion its identity with *L. alboviolascens* is much more likely.

Study of a portion of the type of *Peziza velutina* Desm. showed that Fries was correct in referring this name as a synonym to *Peziza alboviolascens*. He was also correct when he referred the herbarium name *Ascobolus vitis* Wallr. as a synonym to the latter species, as could be verified from the specimen he received.

Peziza syringea Wallr. is referred here on the basis of its description; its author compared it with *P. alboviolascens*.

Myriothecium vitis Bon. is referable here with certainty on the basis of the original account. Bonorden clearly drew basidia and also caught well the characteristic outline of the spore; he wrote, "mit grünlich-schimmerndem Hymenium", which I regard as a trivial discrepancy. The vine seems a favourite host of *Lachnella alboviolascens* and one wonders if *Peziza vitis* Schw. is not still another synonym. Seaver (*1951:* 281) reports that the "type examined May, 1931 shows only lichen apothecia." The original description strongly points into the direction of *Lachnella alboviolascens*.

Moreover, I have been able to study types or portions of types of *Cyphella curreyi* Berk. & Br., *Lachnella alboviolascens* f. *caraganae* P. Karst., *Corticium dubium* Quél., *Cyphella stuppea* Berk. & Br., *C. pezizoides* Zopf, and *Cyphella villosa* f. *sambuci* P. Syd.; all are further synonyms of *Lachnella alboviolascens*. The reason for the introduction of the name *Cyphella curreyi* is discussed on page 31.

For *Peziza nigrocaesia* Schum., see page 58.

The Tulasne brothers (*1851:* 134) concluded that *Cyphella taxi* Lév. was conspecific with *C. alboviolascens*. This is not the case: the type (!) of *Cyphella taxi* shows a quite different species identical with, or very close to, *Cyphella cupulaeformis* Berk. & Rav. apud Berk. The material they cited from *Rhamnus* is true *Lachnella alboviolascens* (specimen seen!) while the material from *Eryngium* they mention undoubtedly belongs to *Lachnella villosa*.

It is not known now, I think, what *Sphaeria tomentosa* Relh. precisely stands for, but the collection Purton discussed in an observation to this treatment of the species represents *Lachnella alboviolascens:* the collection is preserved at Kew.

LACHNELLA VILLOSA (Pers. per Schw.: Fr.) Gillet

Sclerotium villosum Tode, Fungi mecklenb. **1**: 6. 1790 (devalidated name). — Type locality: Germany, Mecklenburg.

Sclerotium villosum var. (α) *album* Tode, Fungi mecklenb. **1**: 6. 1790 (devalidated name) ≡ *Sclerotium villosum* Tode.

Peziza sclerotium Pers., Obs. mycol. **2**: 84. 1799 (devalidated name).

Peziza incarnata Pers., Obs. mycol. **2**: 84. 1799 (devalidated name). — [*Peziza villosa* var. "β. *P. incarnata*" Pers., Syn. Fung. 655. 1801. —] *Peziza villosa* var. *incarnata* (Pers.) A. & S., Consp. Fung. nisk. 325. 1805 (devalidated name). — *Peziza granuliformis* var. *incarnata* (Pers.) *per* Pers., Mycol. europ. **1**: 267. 1822. — Type locality: Germany; type: L 910.261–665. — Fide Fr., Syst. mycol. **2**: 104. 1822 = *Peziza villosa*.

Peziza granuliformis Pers., Syn. Fung. 651. 1801 (devalidated name); not *P. granulaeformis* Schum., Enum. Pl. Saell. **2**: 435. 1803 (devalidated name). — *Peziza granuliformis* Pers. *per* Pers., Mycol. europ. **1**: 267. 1822; not *P. granuliformis* (Crouan) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk. **19**: 50. 1871. — Type locality: Germany; lectotype: L 910.261–665. — Fide Fr., Syst. mycol. **2**: 104. 1822 = *Peziza villosa*.

Peziza villosa Pers., Syn. Fung. 655. 1801 (devalidated name). — [*Peziza granuliformis* var. "β. *Peziza villosa*" Pers., Mycol. europ. **1**: 267. 1822. —] *Peziza villosa* (Pers.) *per* Schw. *in* Schr. naturf. Ges. Leipz. **1**: 120. 1822; Fr., Syst. mycol. **2**: 104. 1822; not *P. villosa* Chev., Fl. gén. Env. Paris **1**: 288. 1826. — *Cyphella villosa* (Pers. per Fr.) Crouan, Fl. Finist. 61. 1867; P. Karst., Fungi Fenn. exs. No. 719. 1868; Berk. & Br. *in* J. Linn. Soc., Lond. (Bot.) **14**: 74. 1873; Cooke & Quél., Clav. Hym. 222. 1878 (cf. Quél. *in* Bull. Soc. bot. France **25**: 290 *pl. 3 f. 14*. 1879); not *C. villosa* (Fr.) Pat., Essai taxon. Hym. 55. 1900. — *Trichopeziza villosa* (Pers. per Fr.) Fuck. *in* Jb. nassau. Ver. Nat. **23–24**: 296. "1869" [1870]. — *Lachnella villosa* (Pers. per Fr.) Gillet, Champ. France, Disc. 80. 1881; Donk *apud* Sing. *in* Lilloa **22**: 345. 1951. — *Chaetocypha villosa* (Pers. per Fr.) O.K., Rev. Gen. Pl. **2**: 848. 1891. — *Solenia villosa* "(Pers. ex Karst.) [W. B.] Cooke ined."; Sing. & Digilio *in* Lilloa **25**: 234. 1952 (matter of record); not *S. villosa* Fr., Syst. mycol. **2**: 200. 1822; ≡ *Peziza sclerotium* Pers.

Peziza villosa var. *candida* A. & S., Consp. Fung. nisk. 325. 1805 (devalidated name) ≡ *Peziza villosa* Pers.

Peziza villosa var. *carnea* Wallr., Fl. crypt. Germ. **2**: 450. 1833. — Type (selected): same as of *Peziza incarnata* Pers.

Cyphella dochmiospora Berk. & Br. *in* Ann. Mag. nat. Hist. IV **11**: 343. 1873; Quél. *in* Bull. Soc. bot. France **25**: 290. 1879 ("*Jochmiospora*"; as a synonym). — *Chaetocypha dochmiospora* (Berk. & Br.) O.K., Rev. Gen. Pl. **2**: 847. 1891. — *Cyphella villosa* f. *dochmiospora* (Berk. & Br.) Jaap *in* Ann. mycol., Berl. **3**: 399. 1905. — Type: Great Britain, Batheaston (Broome, K). — Fide Quél., l.c. = *Cyphella villosa*.

? *Cyphella villosa* f. *major* Pilát *in* Ann. mycol., Berl. **23**: 153. 1925; *in* Publ. Fac. Sci. Univ. Charles No. 29: 45. 1925. — Type locality: Central Bohemia, near Karlik.

DESCRIPTIONS & ILLUSTRATIONS.—Quélet *in* Bull. Soc. bot. France **25**: 290 *pl. 3 f. 14*. 1879 (*Cyphella*); Patouillard, Essai taxon. Hym. 56 *f. 38: 8*. 1900 (*Cyphella*); Bourdot & Galzin, Hym. France. 159. 1928 (*Cyphella*).

Hairs in KOH solution about 150–200 × 4.75–6 μ, colourless, with asperulated surface, the full-grown ones with very thick walls and capillary lumen (lumen somewhat widening in the tip), many with deformed portions which are much swollen and very transparant (asperulation has disappeared) and have a thread-like or vanished lumen. Basidia 40–48–60 × 9–11 μ, with 2–4 conical, curved sterigmata of about 10 × 3 μ. 'Basidioles' numerous, originally subcylindrical with tapering top, then becoming inflated at middle and spindle-shaped, finally like the basidia but with apical nipple. Spores broad inversed-conical, 10–15 × 7–10 μ, adaxially faintly flattened, with distinct, blunt, excentric apiculus.

TYPE LOCALITY.—Germany. Type of *Peziza sclerotium* Pers. ≡ *P. villosa* Pers.: "[prope] Gottingae lecta / *Peziza villosa*" (written by Persoon; L 910.256–1317; devoid of fruit-bodies).

SOME SPECIMENS EXAMINED.—Type, cited above, and several collections mentioned below in the discussion.

The fruit-body is on an average much smaller and more tender than in *Lachnella alboviolascens*, and closes less perfectly to a globular body. The latter species has a more fleshy disk which almost invariably (at least in not too proliferous fruit-bodies) turns dark. The presence of numerous 'basidioles' may be another important difference. Finally, *L. villosa* prefers herbaceous or only slightly woody substrata, while *L. alboviolascens* grows almost invariably on woody substrata (though these may be very thin branches).

A few words may be said about a specimen collected on *Pteris aquilina* (in herb. J. Schroeter, BRSL, Silesia, Trebnitz, Obernigk). It differs in its spores which show a constriction below the top so that it seems as if the latter is surmounted by a broad and relatively large nipple. Some of the spores are almost 'normal', some of them resemble the figures of the spores of *Cyphella turbinata* G. Cunn. (see p. 107).

When Persoon thought he had found the fungus that Tode called *Sclerotium villosum* (more in particular, *S. villosum* var. *album*) he recognized it as as cup-fungus and named it, first, *Peziza sclerotium* Pers., and afterwards, *P. villosa*. Both epithets are presumably inspired by Tode's name and one could defend the thesis that both names Persoon published are mere isonyms of *Sclerotium villosum*, which would mean that the type of *Cyphella villosa* '(Tode) Pers.' is the same as of *Sclerotium villosum*. The correct authors' citation for the name here adopted then would become '(Tode per [Schw.:] Fr.) Gillet. In view of the fact that Persoon never listed *Sclerotium villosum* as a synonym without some indication of uncertainty, I have here followed current practice and treat the name *Peziza sclerotium* as a metonym, based on a different type—one of Persoon's own specimens.

Tode (l.c.) evidently misinterpreted the fungus which he seems to have studied only in the dried condition, when the walls are strongly curved inwards and the fruit-body resembles a globule without any visible mouth or pore. However, the section depicted by Tode shows that he found a hollow inside that communicated with the outside. Although Tode stated "magnitudine arenulae modicae" he depicted the "fungi aggregati, magnitudine naturali" (*fig. 10a*) too big for the present species. He thought the hollow opened downwards (presumably towards the substratum; *fig. 10c*) and he also rendered the hairs as radiating from an outer wall (*fig. 10c*). He indicated the substratum as, "In caulibus *Solani tuberosi* semiputridis." I am not quite convinced that Tode's fungus really is *Lachnella villosa:* it still might be *L. alboviolascens*, which has occasionally been found on the substratum indicated by Tode for his *Sclerotium villosum* var. *album*.

About *Peziza villosa* Pers. we are informed by material kept in his herbarium at Leiden, although some important specimens no longer bear fruit-bodies. One of

these (L 910.256–1317) is labelled in his handwriting, "*Peziza villosa.* / [prope] Gottingae lecta"; this must be taken as type. Another specimen (L 910.261–557), too, is devoid of fruit-bodies; it is labelled, "*Peziza sclerotium* Obs. mycol. ['Syn. fung.' being crossed out] —— *villosa* —— Syn. fung. / *Sclerotium villosum* Tode videtur" (written by Persoon). In both cases the substratum is not a woody one, but may well be umbelliferous stalks; in any case the substratum is 'herbaceous'. A third specimen (L 910.261–812) is still determinable with certainly as *Peziza villosa:* it was sent to Persoon with the label, "in caulibus *Solani tuberosi*", and Persoon named it "*Peziza villosa.* Syn. fung. p. 267."

Persoon published two more names for the present fungus; first, in conjunction with *Peziza villosa*, he introduced *Peziza incarnata* Pers.; and, afterwards, *P. granuliformis* Pers. Already when he published *P. incarnata* the author had his misgivings about its specificity and stated, "Uti et antecedens [*P. villosa*], cujus forte varietas . . .." He soon reduced it formally to the rank of a variety of *P. villosa*. The differences between the two, as stated by Persoon, are that the latter species had white fruit-bodies and *P. incarnata*, pinkish ones. Persoon's and Fries's reduction of *P. incarnata* to *P. villosa* is now generally accepted and seems correct. In both the substratum is big herbaceous stalks.

It is less clear why *P. granuliformis* was published. Its author (Persoon, *1822:* 267) afterwards recognized it himself as conspecific with both *Peziza villosa* and *P. incarnata*, which he appended as varieties (β and γ respectively) to *P. granuliformis*. There are three sheets of *P. granuliformis* preserved. Two of these (L 910.261–665 & 910.261–651) may have formed a single collection. The one which I select as type (L 910.261–665) is labelled in Persoon's handwriting, "*Peziza granuliformis* Syn. fung. p. 6 [51] / —— *villosa* Ejusd. p. 655." It shows that finally he considered the two as completely identical, a conclusion also reached by Fries, and to which I subscribe. A third (L 910.256–1204, "circa Parisios") is also *Lachnella villosa*, while the same applies to a fourth (L 910.261–661; with a "?").

As to *Cyphella villosa* as described by Patouillard (*1884:* 115 *f.* 257), Pilát (*1924:* 208) remarks about it: "Patouillard schreibt unrichtig [Sporen] 4 × 7 μ. Er hat wahrscheinlich *Cyphella stenospora* Bourt. et Galz. zur Hand und vielleicht die wirkliche *Cyphella villosa* Karst. überhaupt nicht gekannt." It would appear that Pilát took these spore measurements from Saccardo. If one computes them from Patouillard's figure, one gets 9–10.5 × 4 μ. If one takes into consideration that Patouillard on several occasions in his "Tabulae" gave spore sizes too small and that he clearly depicted spindle-shaped basidioles as well as somewhat triangular spores, then one may conclude that his determination of the depicted fungus was correct.

LACHNELLA TILIAE (Peck) Donk apud Sing.

Peziza tiliae Peck *in* Rep. New York St. Mus. nat. Hist. **24**: 96. 1872 (n.v.). — *Trichopeziza tiliae* (Peck) Sacc., Syll. Fung. **8**: 428. 1889. — *Cyphella tiliae* (Peck) Cooke *in* Grevillea **20**: 9. 1891. — *Lachnella tiliae* (Peck) Donk *apud* Sing. *in* Lilloa **22**: 245. "1949" [1951].

? *Trichopeziza candida* Clem. *in* Bot. Surv. Nebraska (Stud. Veget. Neb.) **4**: 15. 1896 (n.v.). — Type locality: U.S.A., Nebraska. — Fide Clem., l.c., "possibly *Trichopeziza tiliae* (Peck) Sacc."

DESCRIPTION & ILLUSTRATION.—Burt *in* Ann. Missouri bot. Gdn **1**: 364 *pl. 19 f. 1.* 1914 (*Cyphella*).

Fruit-body turbinate, the disk rather flattened, the dried fruit-body with a hard core which resists crushing under the cover-glass for a considerable time. Hairs in KOH solution –250 μ long (or longer), 5–7.5 μ wide, with lumen capillary only at base and gradually widening upwards, asperulate, locally swollen-deformed as in *L. villosa*. Basidia (especially those at centre of disk) very gradually narrowing downwards, 78–125 × 10.5–14 μ, with 2(–3–4) horn-shaped sterigmata, 7–11 × 3–4 μ long. Spores slender-trigonial ellipsoid, 16–19.5 × 5.75–7 μ, broadest near base, many slightly constricted just above middle, adaxially flattened or even slightly depressed, with almost lateral apiculus; contents granular.

Nearly always on branches of *Tilia*.

TYPE.—U.S.A., New York, Knowersville (Peck, NYS, K).

SPECIMENS EXAMINED.—U.S.A., Type (K); Vermont, Middlebury (Burt, hb. Bourd. 16.101); Missouri, Emma (Demetrio; Rab., Wint., & Pazschke, Fungi europ. & extraeur. No. 3942). CANADA, London (Dearness, in Ell. & Ev., N. Amer. Fungi II No. 2316a, as *Cyphella pezizoides*).

Easily distinguishable from the two other species by its more slender and longer spores, the longer basidia, and by the substratum which is nearly always *Tilia*. It is not known from outside the North American continent.

Other species of Lachnella

CYPHELLA CHEESMANNI Mass.

Cyphella cheesmanni Mass. *in* J. Linn. Soc., Lond. (Bot.) **38**: 411. 1909. — Type locality: S. Rhodesia, Victoria Falls (W. N. Cheesman).

I suspect that this may belong to *Lachnella*, perhaps *L. alboviolascens* ("sporis ovoideis, . . . hyalinis, 12–15 × 7–8 μ"; "in ramis decorticatis"). The indication that the spores are finely asperulate would in that case be an error.

CYPHELLA PYRIFORMIS G. Cunn.

Cyphella pyriformis G. Cunn. *in* Trans. roy. Soc. New Zealand **81**: 184 *fs. C10, D14.* 1953 ("*pyriforma*"). — Holotype: New Zealand, Taranaki, Mt. Egmont (J. M. Dingley).

This would differ from *Lachnella alboviolascens* in the shape of its spores, "pyriform, flask-shaped, or tear-shaped, base rounded, apex long-acuminate".

CYPHELLA TURBINATA G. Cunn.

Cyphella turbinata G. Cunn. *in* Trans. roy. Soc. New Zealand **81**: 185 *fs. C11, D15.* 1953. — Holotype: New Zealand, Otago, Invercargill (W. Faithful).

Another species that seems very close to *Lachnella alboviolascens*, but has "turbinate" spores. The accompanying figure depicts them as pear-shaped (with the narrow end apically); the spores of *Cyphella pyriformis* (see above) are not as typically pear-shaped. Compare a note under *L. villosa* in the present paper on an 'abnormal' European collection, on *Pteris aquilina*.

Cyphella australiensis Cooke (see also p. 69) is based on a specimen that, according to Cunningham (*1953a:* 277) is a specimen of an immature *Aleurodiscus*. I have only seen the later collection referred by Cooke to *C. australiensis* (Australia, New South Wales, Centennial Park, leg. E. Cheel 21, K, on dead branches of Jasmine). This collection Cunningham refers to *Cyphella villosa*, but to me it looks more like typical *Lachnella alboviolascens*, because of the size of the cups (1–1.5 mm in diam.) and the substratum ("on bark"); I did not examine it microscopically.

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SUR UN HYDNELLUM MÉCONNU

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Rijksherbarium, Leiden

(Avec 8 figures dans le texte)

Description et figures de *Hydnellum auratile*, combinaison nouvelle pour une espèce longtemps oubliée, comparaison avec deux autres espèces du même groupe et clé de détermination.

En 1957 M. H. S. C. Huijsman me montra des carpophores d'un *Hydnellum*, récoltés aux environs de Martignat (Ain, France). Ce champignon est appelé «*Calodon aurantiacum*» par les mycologues locaux. Évidemment ce n'est pas le vrai *Hydnellum aurantiacum*, mais puisque je n'avais pas vu le matériel à l'état frais, la question resta indécise.

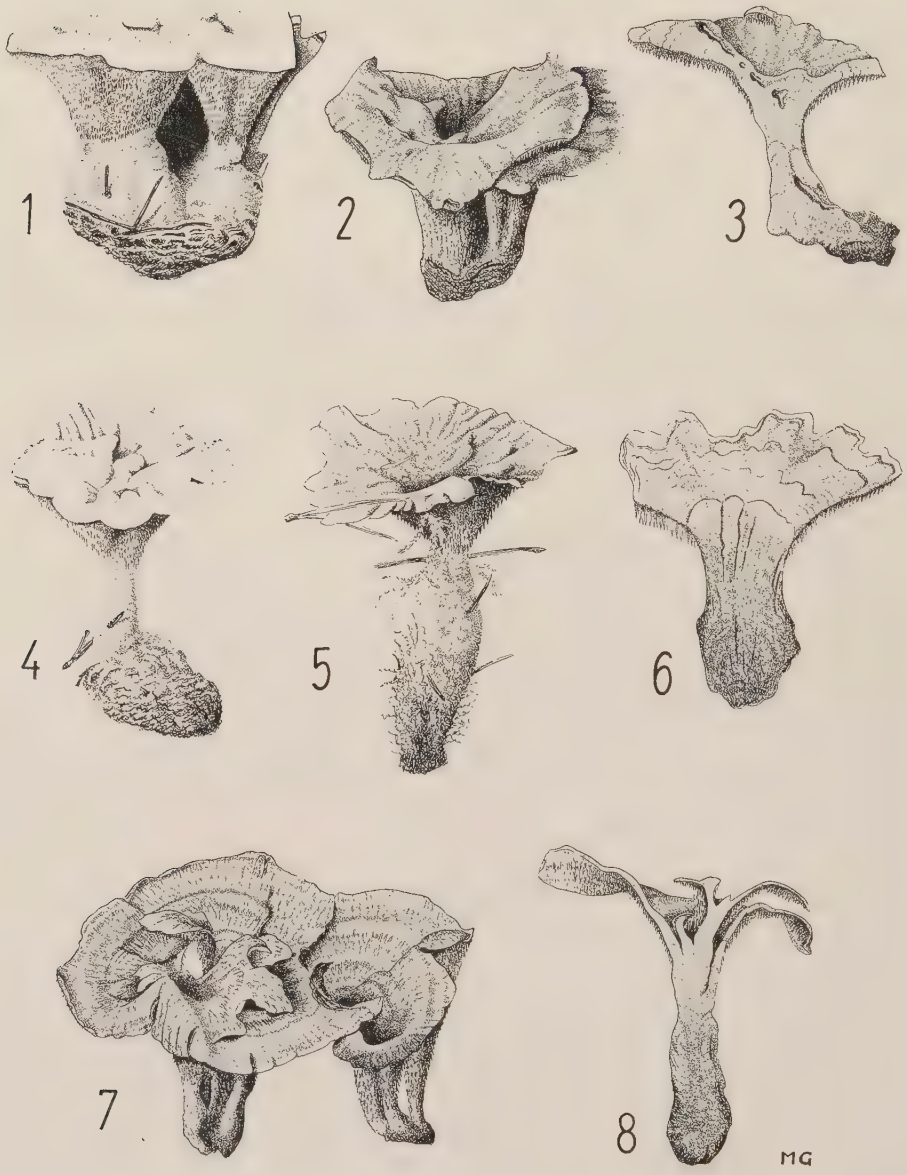
Cependant, le problème m'intriguait. Grâce à la diligence de M. V. Piane, qui s'efforçait généreusement de me montrer des Hydnes vivants, j'avais la bonne chance d'étudier sur le frais l'espèce en question. Celle-ci figura, le 27 septembre 1958, à l'exposition d'Annecy, là aussi sous le nom de «*Calodon aurantiacum*».

Les échantillons de Martignat et d'Annecy sont bien différents de *H. aurantiacum*, quoique appartenant au meme groupe d'espèces. La première description de ce champignon se retrouve chez Britzelmayr sous le nom de *Hydnum auratile*. En vue de ses rapports avec un autre Hydne, *Hydnellum earlianum*, espèce voisine de l'Amérique du Nord, je crois utile de donner une nouvelle description et comparer les trois espèces mentionnées.

Hydnellum auratile (Britzelm.) Maas G., *comb. n.*

Hydnum auratile Britzelm., Hym. Südbayern **8**: 14, pl. 681 fig. 40. 1891; *in* Beih. bot. Centralbl. **26**, Abt. 2: 214. 1909. — Type: d'existence inconnue. — Localité du type: Allemagne, Bavière du Sud.

Espèce plutôt mince à carpophores assez souvent connés par le stipe, et à chapeaux se touchant, ou subimbriqués, ou bien réunis en grandes rosettes. Chapeau entier ou divisé en lobes flabelliformes, surtout au centre, déprimé ou infundibuliforme, jusqu'à 30 mm. de diamètre, presque lisse ou radié-ruguleux, parfois ondulé concentriquement, d'abord légèrement tomenteux, puis finement fibrilleux et un peu satiné, plus ou moins sensiblement marqué de zones concentriques rouillées, orange-briqueté ou fauve-orange, alternées de zones jaunâtres, pâlissant vers le centre avec l'âge, à marge mince, restant longtemps tomenteuse, jaunâtre. Stipe grêle, 20–40 × 2–10 mm., fusiforme ou épaissi-bulbeux à la base, parfois radicant, cotonneux-tomenteux, glabrescent, enveloppant des débris, orange-jaunâtre ou rouge brique, puis s'obscurcissant. Aiguillons décurrents, jusqu'à 3 mm. de long,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fins, serrés, d'abord orange-jaunâtre à pointe blanche, à la fin brun chocolat. Chair fibro-charnue, obscurément zonée et marquée de quelques rares lignes noirâtres, presque homogène et mince, orange-briqueté dans le chapeau, formée de deux couches dans le stipe, l'intérieure assez dure, orange-fauve, se fonçant vers la base, l'extérieure spongieuse-subéreuse, plus molle, jaune-orange, mais devenant d'un brun assez sombre par l'âge. Odeur de farine ou plutot de melon d'eau (*Citrullus vulgaris* Schrad.) par la coupure. Une tranche de la chair plongée dans une solution de KOH se décolore promptement en olive sale.

Hyphes tenaces, grêles, 4–7 μ de diamètre, régulièrement parallèles, peu ramifiées, anastomosées ça et là, à parois minces, à cloisons distantes, sans boucles, hyalines ou d'un brun clair, assez densément couvertes de matière fauve-orange et réfringente, parcourues par des hyphes oléifères, sinueuses, jusqu'à 8 μ de diamètre. Basides claviformes, 28–30 $\times$ 6–7 μ, tétrasporiques, à stérigmates droits, longs de 4,5 μ. Spores subglobuleuses ou ellipsoides mais fortement anguleuses-verruqueuses et de contour irrégulier, 4,9–5,4 $\times$ 4,5 μ, d'un brun jaunâtre clair.

Parmi les mousses et dans l'humus des bois de conifères.

La répartition géographique de cette espèce est, à ce jour, fort mal connue, mais puisqu'elle a été trouvée à Martignat, à Annecy, et en Bavière du Sud, elle serait notamment à rechercher dans les régions interjacentes montagneuses à basse ou moyenne altitude du Jura et des Alpes.

Hydnellum auratile diffère de *H. aurantiacum* (Batsch ex Fr.) P. Karst. par un bon nombre de caractères, dont celui de la chair est le plus remarquable. À l'état frais celle-ci est d'un magnifique orange-briqueté, presque concolore de haut en bas (s'atténuant un peu en séchant), faiblement zonée de jaunâtre et marquée de rares lignes noiratres. *H. aurantiacum*, au contraire, a la chair plus épaisse, fauve-orangé dans le stipe, pâle ou jaunâtre souvent moirée d'un orange plus foncé dans le chapeau, nettement zonée et avec plusieurs lignes noires. D'autres caractères importants se trouvent dans le chapeau et dans les aiguillons. Chez *H. auratile* celui-ci est plus profondément déprimé dès le début, il ne possède pas les bosses et cannelures ainsi que le tomentum accusé si caractéristiques à *H. aurantiacum*. Les aiguillons au bord du chapeau, prenant de bonne heure une couleur orange-jaunâtre ou fauve-orange chez *H. auratile*, restent long-temps blanchâtres ou pâles chez *H. aurantiacum*.

La troisième espèce, *Hydnellum earlianum* Banker (*in* Mem. Torrey bot. Cl. **12**: 161. 1906), qui, du reste, n'a rien à faire avec *Hydnum earleanum* Sumstine (*in* Torreya **4**:

Fig. 1–3. *Hydnellum earlianum* Banker: 1—jeune; ÉTATS-UNIS: North Carolina, Chapel Hill, 17 X 1945, *W. C. Coker 14008* («*H. aurantiacum*», NCU); 2—adulte, et 3—section longitudinale; ÉTATS-UNIS: North Carolina, Chapel Hill, Battle Park, 19 IX 1914, *W. C. Coker 1241* («*H. aurantiacum*», NCU).

Fig. 4–6. *Hydnellum aurantiacum* (Batsch ex Fr.) P. Karst.: 4—jeune; PAYS-BAS: Gelderland, Apeldoorn, IX 1890, *C. A. J. A. Oudemans* (L); 5—adulte; SUÈDE: Uppland, Börje s:n, Ströby, 2 VIII 1930, *J. A. Nannfeldt* (Herb. M. A. Donk); 6—section longitudinale; FRANCE: Haute-Savoie, environs d'Annnecy, 27 IX 1958, anonymus (L).

Fig. 7–8. *Hydnellum auratile* (Britzelm.) Maas G.: 7—adulte, et 8—section longitudinale; FRANCE: Ain, Martignat, 28 IX 1957, *H. S. C. Huijsman* (L).

Tous les figures grandeur naturelle.

59. 1904), ressemble à *H. auratile* par sa chair également orange-briqueté, mais s'en sépare en ce qu'elle montre, au moins dans la jeunesse, une couche supérieure spongieuse bien développée, qui par sa structure plus lâche et par sa couleur jaunâtre contraste nettement avec le reste du chapeau. Cette couche disparaît à la fin à cause d'une collapse de ses hyphes. Le tomentum, qui au début couvre uniformément le chapeau, est d'une couleur vraisemblablement crême ou peut-être blanchâtre dans la jeunesse (il faut remarquer ici que je ne connais l'espèce que des échantillons desséchés), puis s'affaissant en une surface glabre sans aucune trace de vergetures ou de zones. Ceci est bien différent de ce qu'on observe chez *H. auratile*. En outre, les aiguillons submarginaux retiennent longtemps un reflet sulfurin, phénomène inconnu chez *H. auratile*.

Les différences entre les trois espèces, élucidées par les figures ci-jointes, ont été résumées dans la clé suivante.

1*a*. Chair du carpophore d'un orange-briqueté presque concolore de haut en bas, faiblement zonée et avec de rares lignes noires
  2*a*. Chapeau couvert d'un tomentum léger, qui disparaît de bonne heure en laissant une surface finement fibrilleuse et plus ou moins nettement zonée. Aiguillons d'abord orange-jaunatre ou fauve-orange . . . . . *H. auratile*
  2*b*. Chapeau couvert d'un tomentum assez épais, qui avec l'âge se racornit en une surface glabre et azonée. Aiguillons restant longtemps sulfurins, au moins auprès de la marge du chapeau . . . . . *H. earlianum*
1*b*. Chair du chapeau pâle ou jaunâtre, plus ou moins moirée d'un orange plus foncé, passant à fauve-orangé dans le stipe, distinctement zonée et marquée de plusieurs lignes noires . . . . . *H. aurantiacum*

Cette contribution n'a pu être écrite que grâce au concours de plusieurs personnes. M. V. Piane, Martignat, rendit possible l'étude de *H. auratile* sur le frais; M. F. Marti, Neuchâtel, et M. H. S. C. Huijsman, Cernier, eurent la bonté de copier les diagnoses de quelques espèces de Britzelmayr, auxquels je n'avais pas accès, tandis que Mme Huijsman en reproduisit les figures en d'admirables aquarelles. Mlle A.F.Blevins, Chapel Hill, me prêta la très importante collection de *H. earlianum* de l'herbier du feu Prof. Coker, et l'échantillon type de cette espèce me fut envoyé en prêt par le Dr. C. T. Rogerson du «New York Botanical Garden». Enfin, au point de vue de la langue, des indications de grande valeur furent reçues de la part du Dr. J. J. Barkman, Wijster, et de M. Piane. A tous j'exprime ma plus profonde reconnaissance.

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THE STIPITATE HYDNUMS OF THE NETHERLANDS—IV

Auriscalpium S. F. Gray, Hericium Pers. ex S. F. Gray, Hydnum L. ex Fr., and Sistotrema Fr. em. Donk

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A revision is given of the genera *Auriscalpium*, *Hericium*, *Hydnum*, and *Sistotrema*. *Hydnum heimii* is described as a new species.

Auriscalpium S. F. Gray

Auriscalpium S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 650. 1821; P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879. — Type species: *Auriscalpium vulgare* S. F. Gray, see Donk (1956: 71).

Pleurodon P. Karst. *in* Rev. mycol. **3** (No. 9): 20. Jan. 1, 1881; *in* Acta Soc. F. Fl. fenn. **2** (1): 34. 1881 & *in* Medd. Soc. F. Fl. fenn. **6**: 16. 1881 ("Quél."). — *Hydnum* subgen. *Pleurodon* (P. Karst.) Forquignon, Champ. Sup. 96. 1886 [1888] ("Q."). — *Hydnum* [sect.] *Pleurodon* (P. Karst.) J. Schroet. *in* Cohn, Krypt.-Fl. Schles. **3** (1): 456. 1888 ("Quélet"). — Type species: *Hydnum auriscalpium* L. ex Fr., see Donk (1956: 108).

Carpophore stipitate, coriaceous. Pileus hairy, cuticulate. Stipe hairy, cuticulate, springing from swollen subiculum, attached to the pileus subapically from a notch on the side of the latter. Context azonate, homogeneous, covered by very firm cuticle. Hymenium covering spines on underside of pileus. Spines greyish at maturity. Basidia tetrasporous. Spores subglobose to broadly ellipsoid, minutely spinulose at maturity, white in mass, amyloid. Hyphae with clamp connections.

The amyloid character of the spores was first pointed out by Romagnesi (1953: 111).

Auriscalpium vulgare S. F. Gray

Hydnum auriscalpium L., Spec. Pl. **2**: 1178. 1753; *ex* Fr., Syst. mycol. **1**: 406. 1821; Epicr. Syst. mycol. 511. 1838; not *Hydnum auriscalpium* Lour., Fl. cochin. **1**: 693. 1790. — *Scutiger auriscalpium* (L.) Paul., Traité Champ., Atl. pl. 33 fig. 4. 1812–1835 ("*auriseal pium*"). — *Auriscalpium vulgare* S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 650. 1821; P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879 (name change). — *Pleurodon auriscalpium* (L. ex Fr.) P. Karst. *in* Rev. mycol. **3** (No. 9): 20. Jan. 1, 1881; *in* Acta Soc. F. Fl. fenn. **2** (1): 34. 1881 & *in* Medd. Soc. F. Fl. fenn. **6**: 16. 1881 ("Quél."). — *Leptodon auriscalpium* (L. ex Fr.) Quél., Ench. Fung. 192. 1886. — *Auriscalpium auriscalpium* (L. ex Fr.) Banker *in* Mem. Torrey bot. Cl. **12**: 178. 1906. — Type: not known to be in existence. — Type locality: Lapland, ". . . copiosus adhuc per Westrobothniam" (Linn., Fl. lappon. 368. 1737).

Hydnum auriscalpium var. ββ. *bicolor* Alb. & Schw., Consp. Fung. 267. 1805. — Type locality: Germany, Oberlausitz.

Hydnum auriscalpium var. *bicolor* Fr., Obs. mycol. **1**: 146. 1815. — Type locality: Sweden.

Hydnum atro-tomentosum Schwalb, Buch d. Pilze 171. 1891. — Type: not known to be in existence. — Type locality: Austria?

Hydnum fechtneri Vel., České Houby **4–5**: 746. 1922 (Latin description by Pilát *in* Op. bot. čech. **6**: 273. 1948). — *Pleurodon fechtneri* (Vel.) Cejp *in* F. Fl. čechoslov. **2**: 86. 1928; *in* Bull. internat. Acad. Sci. Bohême **31**: 308. 1930. — Type: not seen (PRC).

Pleurodon auriscalpium var. *rufus* Cejp *in* F. Fl. čechoslov. **2**: 86. 1928; *in* Bull. internat. Acad. Sci. Bohême **31**: 308. 1930 ("*rufum*"). — *Hydnum auriscalpium* var. *rufum* (Cejp) Vel., Nov. mycol. nov. 88. 1947. — Syntypes: Bohemia centr., distr. Říčany, apud pag. Mnichovice in pineto "Záduší" dicto, VIII 1915 (not VII 1925 as mentioned by Cejp), leg. *J. Velenovský* (PRC); Bohemia centr., distr. Beroun, in silva apud arcem Karlštejn (Karlův Týn mentioned by Cejp is the same), X 1925, leg. *K. Cejp* (PRC); Bohemia occid., distr. Rokycany, in silva "Boreček" dicta apud opp. Rokycany, 18 VIII 1927, leg. *K. Cejp* (PRC).

DESCRIPTIONS.—Bourdot & Galzin, Hym. France 439. 1928 (*Pleurodon auriscalpium*); Coker & Beers, Stip. Hydn. east. U.S. 11. 1951; Donk *in* Med. Nederl. mycol. Ver. **18–20**: 191. 1931.

ILLUSTRATIONS.—(Except where mentioned otherwise, all given as *Hydnum auriscalpium*.) Bolton, Hist. Fung. Halifax **2**: pl. 90. 1788 (good); Bresadola, Icon. mycol. **22**: pl. 1059. 1932 (passable); Bulliard, Herb. France pl. 481 fig. 3. 1790 (very good); Coker & Beers, Stip. Hydn. east. U.S. pl. 10 upper fig. 1951 (*Auriscalpium vulgare*; photogr.); Farlow, Icon. farlow. pl. 96. 1929 (several centrally stiped; good); Gillet, Champ. France pl. 314. 1878–1890 (good); Gramberg, Pilze Heimat **2**: pl. 28 lower fig. 1913 (fairly good); Greville, Scot. cryptog. Fl. **4**: pl. 196. 1826 (fairly good); Harvey *in* Trans. Brit. mycol. Soc. **41**: pl. 18. 1958 (photogr.); Kawamura, Icon. Jap. Fungi **6**: fig. 605. date? (good); Krombholz, Naturgetr. Abb. Beschr. essb. Schw. **7**: pl. 50 fig. 15–17. 1841 (passable); Maublanc, Champ. France, Quatr. éd., **2**: pl. 196 fig. 2. 1952 (*Auriscalpium vulgare*; good); Meneault *apud* Piane *in* Bull. Soc. Nat. Oyonnax **6**: 89. 1952 (*Auriscalpium vulgare*; excellent); Pabst, Cryptog.-Fl. **2**: pl. 22. 1875 (passable); Patouillard, Tab. anal. Fung. **2**: fig. 146. 1883 (passable); Rolland, Atl. Champ. France pl. 99 fig. 219. 1910 (passable); Schaeffer, Fung. Icon. **2**: pl. 143. 1763 (fairly good); Sowerby, Col. Fig. Engl. Fungi **3**: pl. 267. 1803 (very good); Thijsse, Paddestoelen pl. 63. 1929 (fairly good); Velenovský, České Houby **4–5**: pl. 129 fig. 10. 1922 (*Hydnum fechtneri*; fairly good); Wakefield & Dennis, Common Brit. Fungi pl. 103 fig. 6. 1950 (passable).

DIAGNOSTIC CHARACTERS.—Carpophores solitary, occasionally also several springing from common base. Pileus supported by stipe at a notch on the side, rarely centrally stiped, reniform, plano-convex, even or with shallow concentrical depression, not zonate, villose with few bristle-like hairs to entirely hirsute, glabrescent with age, pale yellowish brown when very young, becoming dark rufous brown, finally blackened. Stipe slender, hirsute, dark brown, downwards passing into much swollen, paler brown subiculum with tomentose, matted or dirt-encrusted surface, not infrequently also branching off from previous season's stipe. Spines not decurrent, pale flesh brownish when immature, finally ashy grey with or without violaceous tinge. Context in both pileus and stipe thin, homogeneous, not zonate, whitish, forming a very firm, cartilagineous, black-brown cuticle on the surface under the hairs. Odour none. Taste not noted.

HABITAT.—On fallen, often buried, cones of *Pinus*.

DISTRIBUTION.—Known from pine woods all over the country, common.

ILLUSTRATIVE COLLECTION.—Gelderland: Delden, Twickel, 22 XI 1953, *M. G. J. Meyer* (L).

AUTHENTIC MATERIAL.—*Hydnum fechtneri* Vel.: Bohemia centr., distr. Kladno (apud opp. Slaný) prope opp. Kladno, X 1919, leg. *F. Fechtner*, det. Velenovský (PRC).

EXSICCATI.—(All given under the name of *Hydnum auriscalpium*.) Cavara, Funghi Longobard. exs. 106 (L); Desmazières, Cryptog. France, ser. 1, 954 (K); Ellis & Everhart, North Amer. Fungi, second ser., 2511 (K, L); Fl. exs. austro-hung. 763 (C, K, L); Fl. hung. exs. 10 (C, K, L); Fuckel, Fungi rhen. 1343 (K); Holl, Schmidt & Kunze, Deutschl. Schw. 45 (K); Karsten, Fungi fenn. exs. 245 (K); Klotzsch, Herb. viv. mycol. 126 (L); Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. 159 (C); Mougeot & Nestler, Stirp. cryptog. vogeso-rhen. 777 (K, L); Rabenhorst, Fungi europ. 17 (K, L); Saccardo, Mycoth. ven. 828 (K); Sydow, Mycoth. march. 313 (K); von Thümen, Mycoth. univ. 1106 (K, L).

The present species shows some variation. The fact that the stipe is sometimes attached to the centre of the pileus has attracted the attention. The plate by Farlow is a good example, and *Hydnum fechtneri* was based on a centrally stiped specimen.

Also with regard to its colour, *A. vulgare* is a variable species. Very young specimens may be found to be no darker than pale yellowish, very old ones are nearly black. This pale colour ("pallide luteum") which Villars (Hist. Pl. Dauph. **3**: 1043. 1789) described for his specimen of *Hydnum auriscalpium*, apparently puzzled Fries (Syst. mycol. **1**: 408. 1821), but in my opinion it only characterizes the young fruit body. Later on, Fries (Hym. europ. 607. 1874) described a *Hydnum luteolum*, basing this species partly on Villars's description, partly on a yellow specimen he had once found himself "Ad ramos exsiccatos *Padi*." Since Fries emphatically stated the pileus to be glabrous, and also since the substratum seems very improbable for *Auriscalpium vulgare*, it is obvious that he described a different species. Afterwards it was transferred by Quélet (Ench. Fung. 191. 1886) to *Leptodon* (*L.* "*luteolum*") and by Bourdot & Galzin (Hym. France 439. 1928) to *Pleurodon* (*P.* "*luteolum*"), but in both cases it was left with *Hydnum auriscalpium* in the same genus. Both species were ultimately separated by Bourdot (*in* Bull. Soc. mycol. France **48**: 220. 1932) who made the recombination *Mycoleptodon luteolus* (Fr.) Bourd. ("*luteolum*").

Hydnum auriscalpium var. *bicolor* is a variety which Fries referred to Albertini & Schweinitz. However, what he described is totally different from the thing the German authors had found. Since Fries stated to have found specimens himself, Sweden is chosen as the type locality of var. *bicolor* Fr.

Pleurodon auriscalpium var. *rufus* described by Cejp has a handsome reddish brown colour, but does not require a varietal status.

HERICIUM Pers. ex S. F. Gray

Martela Adans., Fam. Pl. **2**: 5. 1763. — *Martella* Adans. *ex* O.K., Rev. Gen. Pl. **3** (2): 492. 1898; not *Martella* Endl., Gen. Pl. 36. 1836. — Type species: *Agaricum* ordo VI sp. No. 1 Micheli, Nova Pl. Gen. 122, pl. 64 fig. 1 1729 = *Hericium hystrix* Pers., see Donk (1956: 102).

Hydnum trib. *Pleuropus* Fr., Syst. mycol. **1**: 407. 1821. — Type species: *Hydnum erinaceus* Bull. ex Fr. (selected).

Hydnum trib. *Merisma* Fr., Syst. mycol. **1**: 408. 1821. — *Hydnum* sect. *Merisma* (Fr.) Sacc. *in* Fl. ital. cryptog. **1** (fasc. 15): 1077, 1096. 1916. — *Hydnum* sect. *Apus* [subsect.] *Merisma* (Fr.) Killerm. *in* Nat. Pflfam., Zweite Aufl., **6**: 163. 1928. — Type species: *Hydnum coralloides* Scop. ex Fr. (selected).

Hydnum trib. *Merisma* [subtrib.] *Genuina* Fr., Syst. mycol. **1**: 408. 1821. — Type species: as preceding.

Hydnum trib. *Merisma* [subtrib.] *Gomphi* Fr., Syst. mycol. **1**: 409. 1821. — *Hericium* Fr., Syst. Orb. veg. 88. 1825; not *Hericium* Pers. *ex* S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 652. 1821; not *Hericius* Juss. *ex* Lam., Tabl. encycl. Bot., Ill. Genres **3**: 494. 1823. — Type species: *Hydnum hystrix* (Pers.) ex Fr., see Donk (1956: 80).

Hericium Pers. *in* Neues Mag. Bot. **1**: 109. 1794. — *Hydnum* [sect.] *Hericium* (Pers.) Pers., Syn. meth. Fung. **2**: 563. 1801. — *Hericium* Pers. *ex* S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 652. 1821; not *Hericius* Juss. *ex* Lam., Tabl. encycl. Bot., Ill. Genres **3**: 494. 1823; not *Hericium* Fr., Syst. Orb. veg. 88. 1825. — *Hydnum* sect. *Hericium* (Pers. ex S. F. Gray) L. March. *in* Bijdr. natuurk. Wetensch. **3** (1): 268. 1828. — *Hydnum* sect. *Hydnois* [subsect.] *Hericium* (Pers. ex S. F. Gray) Duby, Bot. gall., Ed. sec., **2**: 777. 1830. — Type species: *Hydnum coralloides* Scop., see Donk (1956: 79).

Hericius Juss. *ex* Lam., Tabl. encycl. Bot., Ill. Genres **3**: 494. 1823; not *Hericium* Pers. *ex* S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 652. 1821; not *Hericium* Fr., Syst. Orb. veg. 88. 1825. — Type species: *Hydnum erinaceus* Bull., see Donk (1956: 95).

Medusina Chev., Fl. gén. Envir. Paris **1**: 278. 1826. — Type species: *Medusina patula* Chev., see Donk (1956: 104).

Martella Endl., Gen. Pl. 36. 1836; not *Martela* Adans., Fam. Pl. **2**: 5. 1763. — Type species: *Martella echinus* Scop., see Donk (1956: 103).

Friesites P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879. — Type species: *Hydnum coralloides* Scop. ex Fr., see Donk (1956: 76).

[*Hydnum* trib. *Merisma* (Genus *Dryodon*, Q.) Cooke & Quél., Clav. syn. Hym. europ. 198. 1878] *Dryodon* P. Karst. *in* Rev. mycol. **3** (No. 9): 19. Jan. 1, 1881; *in* Acta Soc. F. Fl. fenn. **2** (1): 34. 1881 & *in* Medd. Soc. F. Fl. fenn. **6**: 15. 1881 ("Quél."); Quél., Ench. Fung. 192. 1886; Fl. mycol. 437. 1888. — *Hydnum* [sect.] *Dryodon* (P. Karst.) J. Schroet. *in* Cohn, Krypt.-Fl. Schles. **3** (1): 455. 1888 ("Quél."). — *Hydnum* subgen. *Dryodon* (P. Karst.) Forquignon, Champ. sup. 96. 1886 [1888] ("Q."). — Type species: *Hydnum coralloides* Scop. ex Fr., see Donk (1956: 75).

Manina Banker *in* Mycologia **4**: 275. 1912 ("Scop."); not *Manina* Adans., Fam. Pl. **2**: 5. 1763 = "Clavariaceae". — Type species: *Manina cordiformis* Scop., see Donk (1956: 102).

Hericium "riad" *Alpestriformia* Nikol. *in* Pl. cryptog. **5**: 335. 1950 (no Latin description). — Type species: *Hericium alpestre* Pers. [sensu Bresadola] (selected).

Hericium "riad" *Coralloideformia* Nikol. *in* Pl. cryptog. **5**: 341. 1950 (no Latin description). — Type species: *Hydnum coralloides* Scop. ex Fr. [sensu Fr.] (selected).

Carpophores arboricolous or lignicolous, fibrous-fleshy, without true stipe, laterally attached to the substratum by a (sometimes stipe-like) root, and consisting of an almost solid tuberculous body or a much branched mass. Context homogeneous. Hymenium covering spines. Spines white to pinkish. Basidia tetrasporous. Spores globose to ovoid, smooth or nearly so, white in mass, amyloid. Hyphae with clamp connections. Gloeocystidia usually present.

Of the present genus, the same three species treated by Coker and Beers as indigenous to the eastern United States, also occur in Europe. Two of these, *Hericium erinaceus* and *H. ramosum*, are known from the Netherlands, but I have been unable to study living material of either. This, in conjunction with the great variability of the species which I do not know from own observation, led me to deviate fr om the practice of giving my own descriptions. A satisfactory monographic treatment can only be reached in two steps. First, all the names need be accounted for, and there are an amazing number of them. Secondly, some characteristics such as the amyloidity of the context, the production of conidiospores, the place of attachment of the spines to the branches, and which way they are pointing in young and old specimens should be observed in the living material. Clearly, it will take many more years before a sufficient number of fresh specimens will have been studied.

With regard to the formation of conidiospores, reference may be made to the papers by Richon (1881) and De Seynes (1891), and to the more recent ones by Nikolaeva (1958) and Boidin (1959).

KEY TO THE EUROPEAN SPECIES

1*a*. Spines not hanging down from the underside of the branches like teeth of a comb.
  2*a*. Spines exclusively borne in terminal tufts. On a longitudinal section the places of insertion of the spines are seen to form a continuous, even line . *H. erinaceus*, p. 123
  2*b*. Spines borne in terminal tufts as well as on short lateral processes, or covering the ultimate branches on all sides. On a longitudinal section, if not already visible from the outside, the places of insertion of the spines never form a continuous line . . . . . *H. coralloides*, p. 119
1*b*. Spines uniformly produced on the underside of the branches throughout the carpophore, at times also in terminal clusters . . . . . H. *ramosum*, p. 126

HERICIUM CORALLOIDES (Scop. ex Fr.) S. F. Gray

Hydnum coralloides Scop., Fl. carniol., Ed. sec. aucta reform., **2**: 472. 1772; not *Hydnum coralloideum* Batsch, Elench. Fung. 113. 1783 = *Hericium ramosum*. — *Hericium coralloides* (Scop.) Pers. *in* Neues Mag. Bot. **1**: 109. 1794 (misapplied); Comm. Fung. clav. 23. 1797. — *Hydnum coralloides* Scop. *ex* Fr., Syst. mycol. **1**: 408. 1821 (misapplied); Epicr. Syst. mycol. 511. 1838 (misapplied); Hym. europ. 607. 1874 (misapplied). — *Hericium coralloides* (Scop. ex Fr.) S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 652. 1821. — *Medusina coralloides* (Scop. ex Fr.) Chev., Fl. gén. Envir. Paris **1**: 279. 1826 (misapplied). — *Merisma coralloides* (Scop. ex Fr.) Spreng., Syst. Veg., Ed. decima sexta, **4** (1): 496. 1827. — *Friesites coralloides* (Scop. ex Fr.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879 ("*corallioides*"). — *Dryodon coralloides* (Scop. ex Fr.) P. Karst. *in* Rev. mycol. **3** (No. 9): 19. Jan. 1, 1881; *in* Acta Soc. F. Fl. fenn. **2** (1): 34. 1881 & *in* Medd. Soc. F. Fl. fenn. **6**: 15. 1881 ("*corallioides*"). — *Manina coralloides* (Scop. ex Fr.) Banker *in* Mycologia **4**: 276. 1912. — Type locality: Austria, Krain.

Hydnum crispum Scop., Fl. carniol., Ed. sec. aucta reform., **2**: 473. 1772; not *Hydnum crispum* Schaeff., Fung. Icon. **4**: 97. 1774. — Type locality: Yugoslavia, Idria.

Manina flagellum Scop., Diss. Sci. nat. **1**: 97. 1772. — *Hericium flagellum* (Scop.) Pers., Comm. Fung. clav. 25. 1797. — *Hericium flagellum* (Scop.) *ex* Pers., Mycol. europ. **2**: 152. 1825. — *Hydnum flagellum* (Scop. ex Pers.) Streinz, Nomencl. Fung. 320. 1861. — *Manina flagellum* (Scop. ex Pers.) Banker *in* Mycologia **4**: 276. 1912 (misapplied). — Type: represented by Scopoli, Diss. Sci. nat. **1**: pl. 11. 1772.

Hydnum clathroides Pall., Reise Prov. russ. Reich. **2**: 744. 1773 (not seen; descr. copied by

Pers., Comm. Fung. clav. 23. 1797 and by Weinm., Hym.-Gasteromyc. Imp. ross. obs. 361. 1836). — *Hericium clathroides* (Pall.) Pers., Comm. Fung. clav. 23. 1797. — *Hydnum coralloides* var. β? *Hydnum clathroides* (Pall.) Pers., Syn. meth. Fung. **2**: 563. 1801. — *Hydnum clathroides* Pall. *ex* Fr., Syst. mycol. **1**: 409. 1821; Epicr. Syst. mycol. 511. 1838. — *Hericium clathroides* (Pall. ex Fr.) Pers., Mycol. europ. **2**: 151. 1825; Fr., Syst. Orb. veg. **1**: 88. 1825. — *Merisma clathroides* (Pall. ex. Fr.) Spreng., Syst. Veg., Ed. decima sexta, **4** (1): 496. 1827. — *Dryodon clathroides* (Pall. ex Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 239. 1882. — Type locality: U.S.S.R., Siberia, near river Ob, "in pineto Kasmalensi."

? *Hericium alpestre* Pers., Mycol. europ. **2**: 151. 1825. — *Martella alpestris* (Pers.) O.K., Rev. Gen. Pl. **3** (2): 493. 1898; Lloyd, Mycol. Writ. **3**: 457. 1910 ["*alpestre* (Pers.) McGinty"]. — *Hydnum alpestre* (Pers.) Lloyd, Mycol. Writ. **7**: 1229. 1923. — *Dryodon alpestris* (Pers.) Pilát *in* Mykologia **8**: 54, 57. 1931; Bourd. *in* Bull. Soc. mycol. France **48**: 221. 1932 ("*alpestre*"). — Type: *Hericium alpestre* (Helvetia) (L 910.256–1300 and L 910.256–1313).

Dryodon coralloides var. *crispus* Cejp *in* Hedwigia **66**: 273. 1926; *in* F. Fl. čechoslov. **2**: 98. 1928; *in* Bull. internat. Acad. Sci. Bohême **31**: 319. 1930. — Type: not seen (PRC).

MISAPPLICATIONS. — *Hericium stallactiticum* (Schrank) *ex* Fr., Epicr. Syst. mycol. 520. 1838 ("*stalactitium*"). — *Hericium alpestre* f. *caput-ursi* (Fr.) Nikol. *in* Pl. cryptog. **5**: 337. 1950.

DESCRIPTIONS.—Banker *in* Mem. Torrey bot. Cl. **12**: 115. 1906; Coker & Beers, Stip. Hydn. east. U.S. 14. 1951; Miller *in* Mycologia **27**: 367. 1935 (except for form); Miller & Boyle *in* Univ. Iowa Stud. nat. Hist. **18** (2): 57. 1943 (except for form).

ILLUSTRATIONS.—

The normally developed form: Atkinson, Mushrooms, fig. 185. 1900; Second ed., fig. 196. 1901 (*Hydnum caput-ursi*; photogr., very good); Coker & Beers, Stip. Hydn. east. U.S. pl. 8. 1951 (photogr., very good); Foster & Foster *in* Canad. J. Bot. **29**: pl. 5 fig. 1. 1951 (*Hericium* sp.; photogr.); Gillet, Champ. France pl. 317. 1878–1890 (*Hydnum*; unusual); Krombholz, Naturgetr. Abb. Beschr. essb. Schw. **7**: pl. 51 fig. 4. 1841 (*Hydnum*; very good); Lloyd, Mycol. Writ. **7**: pl. 258 fig. 2563. 1923 (*Hydnum alpestre*; photogr. of detail, good); Lorinser, Essb. verdächt. gift. Schw., Dritte Aufl., pl. 3 fig. 4. 1883 (Korallenschwamm; uncertain); von Strauss, Deutschl. Fl., Abt. 3, Pilze Deutschl., Heft 33: pl. 9. 1853 (*Hericium stalactitium*; upside down, excellent); Velenovský, České Houby **4–5**: fig. 134. 1922 (*Hydnum*; very good).

The '*alpestre* sensu Bresadola' form: Bresadola, Icon. mycol. **22**: pl. 1062. 1932 (*Hericium alpestre*; good); Cordier, Champ., Quatr. éd. rev. augm., pl. 44 fig. 1. 1876 (*Hydnum coralloides*; uncertain); Krombholz, Naturgetr. Abb. Beschr. essb. Schw. **7**: pl. 51 fig. 5–7. 1841 (*Hydnum coralloides*; good); Lenz, Abb. nützl. schädl. Schw. pl. 13 fig. 53. 1831 (*Merisma coralloides*; copied from Schaeffer); Nützl. schädl. Schw., Dritte sehr veränd. Aufl., pl. 9 fig. 43. 1862 (*Hydnum coralloides*; copied from Schaeffer); Nees von Esenbeck, Syst. Pilze pl. 33 upper fig. 1817 (*Hydnum Hericium coralloides*; copied from Schaeffer); Nikolaeva *in* Pl. cryptog. **5**: fig. 2. 1950 (*Hericium alpestre*; good); Pabst, Cryptog.-Fl. **2**: pl. 22. 1875 (*Hydnum coralloides*; fairly good); Schaeffer, Fung. Icon. **2**: pl. 142. 1763 (*Hydnum coralloides*; good).

The contracted form: Moffat *in* Nat. Hist. Survey Bull. **7** (1): pl. 19 fig. 1. 1909 (*Hydnum caput ursi*; photogr., uncertain); Nikolaeva *in* Pl. cryptog. **5**: fig. 3 (*Hericium alpestre* f. *caucasicum*; uncertain), fig. 4 (*Hericium alpestre* f. *caput-ursi*; very good). 1950; Pilát *in* Bull. Soc. mycol. France **49**: pl. 1 fig. 4. 1933 (*Dryodon coralloides* f. *caput-ursi*; photogr., indistinct); A. H. Smith, Mushroom Hunter's Field Guide, figs. on p. 51. 1958 (*Hericium* sp.; photogr., fairly good).

HABITAT.—On decaying wood of deciduous trees (*Fagus*) but also reported on conifers (*Picea* and *Abies*).

EXSICCATI.—(Unfortunately, a number of exsiccati received on loan from Copenhagen and Prague cannot be enumerated, since at the time they were studied I did not yet differentiate *H. coralloides* from *H. ramosum*.) Klotzsch, Herb. viv. mycol. 125 (*Hydnum*; L, PR); Rabenhorst, Herb. mycol., ed. 2, 702 (*Hydnum*; L, PR; in part also *H. ramosum*).

As early as 1906 Banker made it perfectly clear that of the distinctly branched (non-tuberculiform) Hericiums two species may be distinguished which he called *H. coralloides* and *H. laciniatum* (= *H. ramosum* in the present paper). The confusing point, however, is that *H. coralloides* taken in the sense of Banker (the correct one) differs from *H. coralloides* as used in the sense of Fries (which in Europe is the one most adhered to). This fact should be emphasized, since to neglect the difference is certain to lead to misunderstanding. Fries, it should be stated at the outset, misapplied the epithet '*coralloides*' to the species here called *Hericium ramosum*.

Although Banker was followed by Miller (1935), Miller & Boyle (1943), and Coker & Beers (1951), his views do not seem to have received recognition in European mycological literature. Bourdot & Galzin (1928) treated *Dryodon corallcides* in the sense of Fries. Cejp's description (1930) of the species is correct, but that is purely accidental. From the illustrations cited, most of which represent *H. ramosum*, it is clear that the author was ignorant of the existence of two species. Donk (1931: 161) stated that his description was supplemented with that by Bourdot & Galzin. Local floras and check-lists, if they mention branched Hericiums at all, enumerate *H. corallcides* only.

Hericium alpestre Pers. is enumerated questioningly. The material is in a bad state, and glued to the sheet in such a way as to render its identification somewhat uncertain. The size of the spores, however, which in a 3 % solution of KOH measure (5.4–)5.8–6.3 × 5.4–5.6 μ, would seem to point to the probability of *H. alpestre* being identical with *H. coralloides*. The nature of the spines which are long (up to 14 mm) and stout (1 mm), likewise speaks in favour of the latter species.

In outward appearance Persoon's material of *H. alpestre* does not in the least resemble Bresadola's illustration (Pl. 1062) under that name. As far as they are discernible, the tightly packed spines in Persoon's specimens all point in the same direction, whereas those depicted by Bresadola, especially the ones at the tips of the branches, are directed to all sides. Through the courtesy of Dr. S. Ahlner, Stockholm, I was enabled to study the material which Bresadola has left under the

name of *Hericium alpestre*. It consists of five packets, all of which contain *H. coralloides*, albeit in very differently developed forms. Two are typical representatives of the species: branches well developed, wide apart; spines in terminal clusters, although occasionally a single, stout spine may be found on the underside of a smaller branch. Two other packets contain material which will be discussed below. The fifth, labelled "Riva-Valdobbia: 1879. Nei dintorni, su tronco fracido. Ab. Carestia," is the most interesting packet in that it contains what well might have been used for the drawing of Plate 1062. The branches are as plump as depicted, and especially the erect portion in the picture with its bushy tips is very much true to nature. Other branches, however, have the tips covered with multitudes of drooping spines, both solitary and clustered. From the above observations it may be concluded that (i) the way the spines are attached to the branches, as well as the direction they are pointed, are variable characters in *H. coralloides*; (ii) *Hericium alpestre* as understood and depicted by Bresadola (1932) and Nikolaeva (1950) is not specifically different from *H. coralloides*. In the present paper this form is referred to as the '*alpestre* sensu Bresadola' form.

Two of the packets from Herb. Bresadola are of particular interest as the contents show *H. coralloides* to vary in a way not heretofore recognized in literature. One packet, indicated by Bresadola as "*Hericium alpestre* Pers. typicus," is labelled as follows: "*Hydnum coralloides* Scop. An einem Fichtenstamme. Oberammergau: hohe Noth. 8. 89. leg. et comm. *Schnabl.*" The other, "In trunco *Abietis pectinatae*. Val di Sole. aut. 1882. Leg. *G. Bresadola*," is inscribed "*Hericium alpestre* Pers. ["typicus" eraded, and rewritten] f. *crispa* Scop., juvenile!"

The former contains two portions of a medium-sized fruit-body which is best described as: the counterpart of *Hydnum caput-ursi*, but, whereas *H. caput-ursi* undoubtedly is a form of *Hericium ramosum*, Schnabl's specimens are related to *H. coralloides* on account of the lack of spines hanging down from the lower side of the branches like teeth of a comb. The few spines that do emerge from the underside of some of the branches are stouter and longer than are those of *H. ramosum*. This form is well illustrated by Nikolaeva (*in* Pl. cryptog. **5**: fig. 4. 1950) under the name of *Hericium alpestre* f. *caput-ursi*.

The second packet contains a smaller and much more contracted specimen with very short branches, at the tips of which short spines emerge from all sides.

Both collections give evidence of the existence in *H. coralloides* of a form characterized by much shortened branches which for the greater part coalesce to form the main body.

This form is not uncommon, but it was nearly always referred to *Hydnum caput-ursi*. Even in recent times Miller (1935: 367) and Miller & Boyle (1943: 57) stated that *H. coralloides* "merges gradually into the form commonly known as *H. caput-ursi*." Coker & Beers (1951: 14) simply mentioned *Hydnum caput-ursi* as a synonym of *Hericium coralloides*. This is incorrect. *Hydnum caput-ursi* is a form of *Hericium ramosum*, the corresponding form in *H. coralloides* has no name. Whether it deserves a name, I feel unable to decide as yet, but I doubt it.

Hericium coralloides was recorded by Miss Cool (1926: 83) from this country. However, no description was supplied and no material seems to have been preserved.

HERICIUM ERINACEUS (Bull. ex Fr.) Pers.

Martella echinus Scop. *in* Ann. hist.-nat. **4** (4): 151. 1770. — *Hericium echinus* (Scop.) Pers., Comm. Fung. clav. 28. 1797. — *Hydnum echinus* (Scop.) *ex* Fr., Syst. mycol. **1**: 410. 1821; Epicr. Syst. mycol. 520. 1838; Hym. europ. 617. 1874. — *Hericium echinus* (Scop. ex Fr.) Pers., Mycol. europ. **2**: 154. 1825. — *Martella echinus* (Scop. ex Fr.) O.K., Rev. Gen. Pl. **3** (2): 492. 1898. — Type locality: Schemnitz = Selmecz bánya (of former Hungary) = Banská Štiavnica (now Czecho-Slovakia).

Manina cordiformis Scop., Diss. Sci. nat. **1**: 97. 1772. — *Hericium cardium* Pers., Mycol. europ. **2**: 153. 1825 (name change). — *Manina cordiformis* Scop. *ex* Banker *in* Mycologia **4**: 277. 1912. — Type: represented by Scopoli, Diss. Sci. nat. **1**: pl. 10. 1772.

Hydnum erinaceus Bull., Herb. France (legend to) pl. [34]. 1780; Hist. Champ. France 304. 1791; not *Hydnum erinaceus* Retz., Fl. Scand. Prodr. 251. 1779; Ed. alt. 319. 1795 = *Hericium ramosum*. — *Clavaria erinaceus* (Bull.) Paul., Traité Champ. **2**: Index. 1793 ("*erinacea*"). — *Hericium erinaceus* (Bull.) Pers., Comm. Fung. clav. 27. 1797. — *Hydnum erinaceus* Bull. *ex* Fr., Syst. mycol. **1**: 407. 1821. — *Steccherinum quercinum* S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 651. 1821 (name change); not *Hydnum quercinum* (Pers.) *ex* Fr., Syst. mycol. **1**: 423. 1821. — *Hericium erinaceus* (Bull. ex Fr.) Pers., Mycol. europ. **2**: 153. 1825. — *Hericium commune* Roq., Hist. Champ. comest. vén. 47. 1832; Deux. éd. rev. augm. 107. 1841 (name change). — *Dryodon erinaceus* (Bull. ex Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 92. 1882 ("Quélet"). — Type: represented by Bulliard, Herb. France pl. [34]. 1780.

Hydnum hystricinum Batsch, Elench. Fung. 113. 1783. — *Martella hystricinum* (Batsch) *ex* O.K., Rev. Gen. Pl. **3** (2): 493. 1898. — Type: represented by Micheli, Nova Pl. Gen. pl. 64 fig. 1. 1729.

Clavaria caput-medusae Bull., Herb. France (legend to) pl. 412. 1788; Hist. Champ. France 210. 1791. — *Hericium caput-medusae* (Bull.) Pers., Comm. Fung. clav. 26. 1797. — *Hydnum caput-medusae* (Bull.) Pers., Syn. meth. Fung. **2**: 564. 1801. — *Hydnum caput-medusae* (Bull.) *ex* Fr., Syst. mycol. **1**: 409. 1821; Elench. Fung. **1**: 133. 1828; Epicr. Syst. mycol. 512. 1838; Hym. europ. 608. 1874. — *Hericium caput-medusae* (Bull. ex Fr.) Pers., Mycol. europ. **2**: 154. 1825. — *Medusina patula* Chev., Fl. gén. Envir. Paris **1**: 279. 1826 (name change). — *Merisma caput-medusae* (Bull. ex Fr.) Spreng., Syst. Veg., Ed. decima sexta, **4** (1): 496. 1827. — *Dryodon caput-medusae* (Bull. ex Fr.) Quél., Ench. Fung. 193. 1886; Fl. mycol. 439. 1888. — *Dryodon erinaceus* var. *caput-medusae* (Bull. ex Fr.) Quél. *apud* A. Mougeot & Ferry, Fl. Vosges 497. 1887. — *Hydnum erinaceus* var. *caput-medusae* (Bull. ex Fr.) Cost. & Dufour, Nouv. Fl. Champ. 161. 1891. — *Dryodon erinaceus* "Forme: *Hydnum caput-medusae* Bull." Bourd. & Galz., Hym. France 443. 1928. — *Hericium erinaceus* f. *caput-medusae* (Bull. ex Fr.) Nikol. *in* Pl. cryptog. **5**: 340. 1950. — Type: represented by Bulliard, Herb. France pl. 412. 1788.

Clavaria conferta Paul., Traité Champ. **2**: Index. 1793 (for descr. see p. 427: "La Houppe des arbres"). — Type: represented by Paulet, Traité Champ., Atl. pl. 195 fig. 3–4. 1812–1835 (*Clavaria multicoma*, La houpe des arbres).

Hericium hystrix Pers., Comm. Fung. clav. 27. 1797. — *Hericium strictum* Pers., Traité Champ. comest. 252. 1818 (name change). — *Hydnum strictum* (Pers.) *ex* Steud., Nomencl. bot. **2**: 205. 1824. — *Hydnum hystrix* (Pers.) *ex* Fr., Syst. mycol. **1**: 410. 1821. — *Hericium hystrix* (Pers. ex Fr.) Pers., Mycol. europ. **2**: 154. 1825. — *Merisma hystrix* (Pers. ex Fr.) Spreng., Syst. Veg., Ed. decima sexta, **4** (1): 496. 1827. — *Martella hystrix* (Pers. ex Fr.) Lloyd, Mycol. Writ. **3**: 457. 1910 ("McGinty"). — Type: represented by Micheli, Nova Pl. Gen. pl. 64 fig. 1. 1729.

Hericium hystrix var. β *H. scoparium* Pers., Comm. Fung. clav. 28. 1797. — Type: represented by Boccone, Mus. Fis. Esperienze pl. 307 fig. [1]. 1697.

Hydnum agaricinum G. F. Hoffm., Veg. Hercyn. subterr. 24. 1811. — Type: represented by G. F. Hoffm., Veg. Hercyn. subterr. pl. 14 fig. 3. 1811.

Hericium grande Rafin. *in* J. Bot., Desveaux, **1**: 236. 1813; Préc. Découv. Trav. somiol. 50. 1814. — *Hydnum grande* (Rafin.) *ex* Steud., Nomencl. bot. **2**: 204. 1824. — Type locality: U.S.A., New Jersey.

Hericium erinaceus var. β. *sulphureum* Thore *apud* Pers., Mycol. europ. **2**: 153. 1825. — Type: none. — Type locality: France?

? *Hericium erinaceus* var. γ. *viridescens* Pers., Mycol. europ. **2**: 153. 1825. — Type locality: France, Lot-et-Garonne, Agen, "dans les bois de Pléneselve" (St. Amans, Fl. agen. 545. 1821).

Hericium unguiculatum Pers., Mycol. europ. **2**: 153. 1825. — *Hydnum unguiculatum* (Pers.) Streinz, Nomencl. Fung. 326. 1861. — Type: none. — Type locality: France, Lyon ("Lugdunum Gallorum").

Hydnum omasum Panizzi *in* Comm. Soc. crittog. ital. **1**: 175. 1862. — Type locality: Italia, Liguria, Ceriana near San Remo.

Hydnum notarisii Inzenga, Funghi sicil. **1**: 5. 1869 (not seen). — *Hericium notarisii* (Inz.) Fr., Hym. europ. 617. 1874. — *Martella notarisii* (Inz.) O.K., Rev. Gen. Pl. **3** (2): 493. 1898; Lloyd, Mycol. Writ. **3**: 457. 1910 ("McGinty"). — Part of type: not seen (UPS, according to Lloyd, Mycol. Writ. **6**: 1081. 1921 & **7**: 1229. 1923).

Dryodon juranus Quél. *in* C.R. Assoc. franç. Avanc. Sci. **30**: 496 (3 of reprint). 1902 ("*juranum*"). — *Hydnum juranum* (Quél.) P. A. Sacc. & D. Sacc., Syll. Fung. **17**: 150. 1905. — Type: represented by Quélet *in* C.R. Assoc. franç. Avanc. Sci. **30**: pl. 3 fig. 10. 1902.

DESCRIPTIONS.—Banker *in* Mem. Torrey bot. Cl. **12**: 119. 1903; Bourdot & Galzin, Hym. France 442. 1928 (*Dryodon*); Coker & Beers, Stip. Hydn. east. U.S. 12. 1951; Miller *in* Mycologia **27**: 368. 1935; Miller & Boyle *in* Univ. Iowa Stud. nat. Hist. **18** (2): 55. 1943.

ILLUSTRATIONS.—

The normally developed form (if not stated otherwise, all given as *Hydnum erinaceus*): Atkinson, Mushrooms fig. 186. 1900; Second ed., fig. 197. 1901 (photogr., good); Boccone, Mus. Fis. Esperienze pl. 307 figs. to the left. 1697 (*Fungus Erinaceus*; recognizable); Boudier, Icon. mycol. **1**: pl. 166. 1904–1910 (sterile form); Bresadola, Icon. mycol. **22**: pl. 1060. 1932 (fairly good); Bulliard, Herb. France pl. [34]. 1780 (good); Coker *in* J. Mitch. sci. Soc. **34**: pl. 8. 1919 (*Manina cordiformis*; photogr., good); Coker & Beers, Stip. Hydn. east. U.S. pl. 7. 1951 (*Hericium*; photogr., good); Cordier, Champ., Quatr. éd. rev. augm., pl. 44 fig. 2. 1876 (fairly good); Dumée, Nouv. Atl. Champ. comest. vén., Prem. éd., sér. 2: pl. 54. 1911 (good); Fl. batava **28**: pl. 2235. 1932–1934 (*Hericium*; good); Gillet, Champ. France pl. 318. 1878–1890 (good); Krombholz, Naturgetr. Abb. Beschr. essb. Schw. **7**: pl. 51 fig. 1–3. 1841 (good); Lenz, Abb. nützl. schädl. Schw. pl. 12 fig. 52. 1831; Nützl. schädl. Schw., Dritte sehr veränd. Aufl., pl. 9 fig. 44. 1862 (passable); Leuba, Champ. comest. pl. 38 fig. 2. 1890 (fairly good); Lorinser, Essb. verdächt. gift. Schw., Dritte Aufl., pl. 3 fig. 6. 1883 (Igelschwamm; passable); Maublanc, Champ. France, Quatr. éd., **2**: pl. 193. 1952 (*Hericium*; fairly good); Micheli, Nova Pl. Gen. pl. 64 fig. 1. 1729 (*Agaricum esculentum, album* . . . ; recognizable); Nikolaeva *in* Pl. cryptog. **5**: fig. 5–6. 1950 (*Hericium*; good); Ramsbottom, Mushrooms & Toadst., New ed., pl. XVI fig. b. 1954 (photogr., good); Richon *in* Bull. Soc. bot. France **28**: pl. 4 fig. 1. 1881 (section, good); Richon & Roze, Atl. Champ. pl. 64 fig. 1–2. 1886 (*Dryodon*; good); Rolland, Atl. Champ. France pl. 100

fig. 220. 1910 (good); A. H. Smith, Mushroom Hunter's Field Guide fig. on p. 52. 1958 (photogr.; good); Trattinnick, Fung. Austr., Ed. nova, pl. 18 fig. 35. 1830 (mediocre); Vittadini, Descr. Funghi mang. pl. 26. 1835 (good).

The '*caput-medusae*' form: Boccone, Mus. Fis. Esperienze pl. 303 fig. 6. 1697 (*Fungus setaceus*; recognizable); Bulliard, Herb. France pl. 412. 1788 (*Clavaria*; recognizable); Nees von Esenbeck, Syst. Pilze pl. 33 lower fig. 1817 (*Hydnum Hericium caput-medusae*; copied from Bulliard); Nikolaeva *in* Pl. cryptog. **5**: fig. 8a–8b. 1950 (*Hericium erinaceus* f. *caput-medusae*; uncertain); Roques, Hist. Champ. comest. vén. pl. 2 fig. 3. 1832 (*Hericium*; recognizable).

HABITAT.—On frondose trees, mainly *Fagus* and *Quercus*.

DISTRIBUTION.—Uncommon, reported from various parts of the country.

ILLUSTRATIVE COLLECTION.—Gelderland: Uddel, Uddelermeer, 19 X 1952, H. Koot (L).

EXSICCATI.—(All given as *Hydnum erinaceus*.) Fuckel, Enum. Fung. Nassov., ser. 1: 943 (L); Litschauer & Lohwag, Fungi sel. exs. europ. 174 (PR); Rabenhorst-Winter, Fungi europ. 3641 (L); Roumeguère, Fungi gall. exs. 2106 (L).

While it is true that no other than Bulliard's *Hydnum erinaceus* can be accepted as the basinym for the present species, the attention may be drawn to the fact that the specific epithet had already been used earlier for what may well be the same species. In describing "le Hérisson" which is the French name for *Hericium erinaceus*, Paulet (Traité Champ. **2**: 424. 1793) referred to Breyne ("Cette espèce que J. Breyne a fait connoître . . ."), who was equally mentioned by Dillenius (Cat. Pl. Giss. nasc. 197. 1719) when describing his *Bovista erinacea*: "Fungus barbatus quercinus teterrime foetidus *J. Breyn.* Eph. G. D. 1. A. 4 O. 151. *Breynius* forte jam putrescentem invenit, nobis enim nullus iu recenti foetor animadversus."

Although *Hydnum hystricinum* Batsch and *Hericium hystrix* Pers. were based on the same type, Micheli's plate, there is no evidence that the latter is a name change of the former, and for this reason both are enumerated separately.

Micheli's illustration almost certainly represents a peculiar form of the present species. The description Fries gave of *Hydnum hystrix* which he stated to have found himself, is also in favour of the view that *H. hystrix* is only a form of *H. erinaceus*. But the strange fact remains that practically no one after Fries has seen it. Villinger (1934) published a note on what he considered to be this form, but his description rather suggests the 'alpestre sensu Bresadola' form of *Hericium coralloides*.

Hydnum caput-medusae has in the course of time been evaluated in very different ways, but in conformity with my views regarding the variability in *H. coralloides* and *H. ramosum*, it is here being referred to as the '*caput-medusae*' form which differs from normally developed *H. erinaceus* in the tendency of the fruit-body of being more broken up at its periphery into separate branches, and in its upper surface being densely covered with deformed spines.

Hericium erinaceus var. *viridescens* is enumerated with some doubt. It may well be asked, as did Persoon himself, whether, on account of its colour, it belongs to

the genus *Hericium* at all. Or would it be possible to think of this var. *viridescens* as a specimen of *H. erinaceus* which, after having been killed and quickly dried during a dry spell, has become overgrown with algae or green moulds in the next wet period?

Hericium unguiculatum, indicated with an asterisk, by which Persoon meant to say that he was in doubt as to its proper position, may, with little chance of being mistaken, be regarded as a drought-form on account of its small size and the recurved tips of its spines.

As far as may be judged from Panizzi's description, *Hydnum omasum* seems to be a sessile form of the present species which has already turned yellow in the field. Whether *Hericium botryoides* S. Ito & Ôtani (apud Ôtani, 1957: 306) should be considered conspecific with *Hydnum omasum* and hence with *Hericium erinaceus*, is difficult to say with certainty, but it does not seem too improbable.

On the authority of Boudier (1911: 85), *Clavaria conferta* Paul. ("Houppe des arbres") and *Dryodon juranus* Quél. are included in the synonymy, representing the conidia-bearing state of the present species. As a matter of fact, there is a marked resemblance between Boudier's plate and those of Paulet and Quélet.

Panizzi (1862: 175) believed that *Hydnum ramaria* of Fries (Syst. mycol. **1**: 410. 1821) could be identified as a "bizarre" variety of *H. erinaceus*, on the grounds that he had received a specimen which was intermediate between both. I have no opinion myself.

HERICIUM RAMOSUM (Bull. ex Mérat) Letellier

? *Manina ramosissima* Scop., Diss. Sci. nat. **1**: 98. 1772; not *Hydnum ramosissimum* L. March. & R. Court. *in* Bijdr. natuurk. Wetensch. **3** (1): 268. 1828. — *Hericium nudicaule* Pers, Comm. Fung. clav. 25. 1797 (name change); *ex* Pers., Mycol. europ. **2**: 152. 1825. — Type: represented by Scopoli, Diss. Sci. nat. **1**: pl. 12. 1772.

Hydnum laciniatum Leers, Fl. herborn. 276. 1775. — *Hericium laciniatum* (Leers) *ex* Banker *in* Mem. Torrey bot. Cl. **12**: 114. 1906. — Type locality: Germany, Nassau, Herborn, "in der Hörre."

Hydnum erinaceus Retz., Fl. Scand. Prodr. 251. 1779; Ed. alt. 319. 1795; not *Hydnum erinaceus* Bull., Herb. France (legend to) pl. [34]. 1780 = *Hericium erinaceus*. — Type: represented by Oeder *in* Fl. dan. **3**, Fasc. 8: pl. 450. 1769 (selected).

Hydnum coralloideum Batsch, Elench. Fung. 113. 1783; not *Hydnum coralloides* Scop., Fl. carniol., Ed. sec. aucta reform., **2**: 472. 1772 = *Hericium coralloides*. — Type: represented by Micheli, Nova Pl. Gen. pl. 64 fig. 2. 1729.

Hydnum stallactiticum Schrank, Baier. Fl. **2**: 624. 1789; Reise südl. Gebirg. Bayern 130. 1793 [Fr., Syst. mycol. **1**: 410. 1821 ("*stalactitium*", not definitely accepted)]. — *Hericium abietinum* subsp. β *stallactiticum* (Schrank) Pers., Comm. Fung. clav. 25. 1797 ("*stalactitium*"). — *Hydnum coralloides* var. δ? *Hydnum stallactiticum* (Schrank) Pers., Syn. meth. Fung. **2**: 564. 1801. — *Hericium stallactiticum* (Schrank) *ex* Fr., Epicr. Syst. mycol. 520. 1838 ("*stalactitium*", misapplied). — Type locality: Germany, Bavaria.

Hydnum ramosum Bull., Herb. France (legend to) pl. 390. 1788; Hist. Champ. France 305. 1791; *ex* Mérat, Nouv. Fl. Envir. Paris, Deux. éd., **1**: 37. June 1821; not *Hydnum ramosum* Schw. *in* Schr. naturf. Ges. Leipzig **1**: 104. 1822. — *Hericium ramosum* (Bull. ex Mérat) Letellier, Hist. Descr. Champ. 43. 1826. — Type: represented by Bulliard, Herb. France pl. 390. 1788.

Clavaria cornu-cervi Paul., Traité Champ. **2**: Index. 1793 (for descr. see p. 427: "La Chevelure

des arbres blanche" ou "la Corne du Cerf"). — Type: represented by Clusius *apud* Istvánffi, Étud. Comm. Code Escluse pl. 83. 1900.

Hydnum abietinum Schrad., Spicil. Fl. germ. **1**: 181. 1794. — *Hericium abietinum* (Schrad.) Pers., Comm. Fung. clav. 24. 1797. — *Hydnum coralloides* var. γ? *Hydnum abietinum* (Schrad.) Pers., Syn. meth. Fung. **2**: 564. 1801. — *Hericium abietinum* (Schrad.) *ex* Schleich., Cat. Pl. Helvet., Ed. quarta em. aucta 57. 1821 ("P."). — *Hydnum abietinum* Schrad. *ex* Oudem., Enum. syst. Fung. **2**: 629. 1920; not *Hydnum abietinum* (Pers.) Duby, Bot. gall., Ed. sec., **2**: 778. 1830. — Type locality: Germany.

Hydnum muscoides Schum., Enum. Pl. Saelland. **2**: 394. 1803; not *Manina muscoides* Scop., Diss. Sci. nat. **1**: 99. 1772; not *Hydnum muscoides* Lloyd, Mycol. Writ. **7**: 1227. 1923. — Type locality: Denmark, Sjaelland.

Clavaria madreporaeformis Retz., Diss. Suppl. Ed. secund. Prodr. Fl. Scand. 19. 1805. — Type locality: Sweden, Lund.

Hydnum coralloides var. α. *heteromorpha* Alb. & Schw., Consp. Fung. 272. 1805. — Type locality: Germany, Oberlausitz, "Quizdorf; Moholzer Haide."

Hydnum ramosum Schw. *in* Schr. naturf. Ges. Leipzig **1**: 104. 1822; not *Hydnum ramosum* Bull. *ex* Mérat, Nouv. Fl. Envir. Paris, Deux. éd., **1**: 37. 1821. — Type locality: U.S.A., North Carolina.

? *Hericium mori* Opiz *in* Lotos **1**: 256. 1851. — Type locality: Czecho-Slovakia, Prague, "Marien-Schanz."

Hericium reichii Opiz *in* Lotos **1**: 256. 1851. — Type locality: Czecho-Slovakia, presumably Prague.

Hydnum caput-ursi Fr., Monogr. Hym. Suec. **2**: 278. 1863; Icon. sel. Hym. **1**: 9. 1867; Hym. europ. 608. 1874. — *Hydnum coralloides* var. *caput-ursi* (Fr.) Cooke & Quél., Clav. syn. Hym. europ. 198. 1878. — *Friesites caput-ursi* (Fr.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **5**: 41. 1879. — *Dryodon coralloides* subsp. *Dr. caput-ursi* (Fr.) P. Karst. *in* Rev. mycol. **3** (No. 9): 19. Jan. 1, 1881; *in* Acta Soc. F. Fl. fenn. **2** (1): 34. 1881 & *in* Medd. Soc. F. Fl. fenn. **6**: 15. 1881. — *Dryodon coralloides* var. *caput-ursi* (Fr.) Quél., Ench. Fung. 192. 1886; Fl. mycol. 438. 1888 (misapplied). — *Hericium caput-ursi* (Fr.) Banker *in* Mem. Torrey bot. Cl. **12**: 118. 1906 (misapplied); Corner *apud* Balfour-Browne *in* Bull. Brit. Mus. (nat. Hist.) (Bot.) **1**: 192. 1955 (misapplied, material examined). — *Manina caput-ursi* (Fr.) Banker *in* Mycologia **4**: 277. 1912. — *Dryodon coralloides* "Forme tératologique: *Hydnum caput-ursi* Fr." Bourd. & Galz., Hym. France 442. 1928. — *Dryodon coralloides* f. *caput-ursi* (Fr.) Pilát *in* Bull. Soc. mycol. France **49**: 41. 1933 ("Bourd. & Galz.", misapplied, material examined). — *Hericium alpestre* f. *caput-ursi* (Fr.) Nikol. *in* Pl. cryptog. **5**: 337. 1950 (misapplied). — *Hericium coralloides* f. *caput-ursi* (Fr.) Nikol. *in* Pl. cryptog. **5**: 342. 1950 ["(Bourd. & Galz.)"]. — Type locality: Sweden, Södermanland, near Tvetaberg.

[*Hydnum coralloides* "b. subterraneum, undique aculeatum . . ." Fr., Syst. mycol. **1**: 409. 1821.] *Hydnum coralloides* var. β *subterraneum* Kickx, Fl. cryptog. Flandres **2**: 254. 1867; not *Hydnum coralloides* var. *subterraneum* Harz *in* Bot. Centralbl. **37**: 342. 1889. — Type locality: Scandinavia (selected).

Hydnum aciculare Sacc. *in* Michelia **2**: 154. 1880; Syll. Fung. **6**: 447. 1888. — *Dryodon acicularis* (Sacc.) Bourd. *in* Bull. Soc. mycol. France **48**: 221. 1932 ("*aciculare*", misapplied?). — Type: *Hydnum aciculare* (PAD).

Hydnum novae-zealandiae Colenso *in* Trans. Proc. New Zeal. Inst. **21**: 79. 1889. — Type: *Hydnum novae-zealandiae* Col. (part of type, K).

Hydnum coralloides var. *subterraneum* Harz *in* Bot. Centralbl. **37**: 342. 1889 ("*subterranea*"); not *Hydnum coralloides* var. *subterraneum* Kickx, Fl. cryptog. Flandres **2**: 254. 1867. — Type locality: Germany, Oberbayern, in a mine at Hausham.

Hydnum caput-ursi var. *brevispineum* Peck *in* Bull. N.Y. State Mus. **5**: 656. 1899. — Type: not seen (NYS?).

Hericium coralloides f. *confluens* Nikol. *in* Pl. cryptog. **5**: 342. 1950 (no Latin description). — Type: not indicated, represented by Nikol. *in* Pl. cryptog. **5**: fig. 10. 1950.

MISAPPLICATIONS.—*Hericium coralloides* (Scop.) Pers. *in* Neues Mag. Bot. **1**: 109. 1794. — *Hydnum coralloides* Scop. *ex* Fr., Syst. mycol. **1**: 408. 1821; Epicr. Syst. mycol. 511. 1838; Sverig. ätl. gift. Svamp. 23. 1862; Hym. europ. 607. 1874. — *Medusina coralloides* (Scop. ex Fr.) Chev., Fl. gén. Envir. Paris **1**: 279. 1826.

DESCRIPTIONS.—Atkinson, Mushrooms 196. 1900; Second ed. 196. 1901 (*Hydnum coralloides*); Banker *in* Mem. Torrey bot. Cl. **12**: 114. 1906 (*H. laciniatum*); Bourdot & Galzin, Hym. France 442. 1928 (*Dryodon coralloides*); Coker & Beers, Stip. Hydn. east. U.S. 15. 1951 (*H. laciniatum*); Miller *in* Mycologia **27**: 366. 1935 (*H. laciniatum*); Miller & Boyle *in* Univ. Iowa Stud. nat. Hist. **18** (2): 57. 1943 (*H. laciniatum*).

ILLUSTRATIONS.—

The normally developed form: Atkinson, Mushrooms fig. 184. 1900; Second ed., fig. 195. 1901 (*Hydnum coralloides*; photogr., very good); Boccone, Mus. Fis. Esperienze pl. 303 fig. 7 (*Fungus muscosus albus . . .*; recognizable), pl. 304 fig. 2 (*Fungus ramosus abietin.*; juvenile?). 1697; Bulliard, Herb. France pl. 390. 1788 (*Hydnum ramosum*; good); Clusius apud Istvánffi, Étud. Comm. Code Escluse pl. 83. 1900 (passable); Coker *in* J. Mitch. sci. Soc. **34**: pl. 9 (fairly good), pl. 10 (indistinct, juvenile?). 1919 (*Manina flagellum*; photogr.); Coker & Beers, Stip. Hydn. east U.S. pl. 9. 1951 (*Hericium laciniatum*; photogr., juvenile); Cunningham *in* Trans. Roy. Soc. New Zealand **85**: pl. 42 fig. 2. 1958 (*Hericium coralloides*; photogr., good); Favre-Guillarmod, Champ. comest. cant. Neuchâtel, Deux. livr., pl. facing p. 27. 1869 (*Hydnum coralloides*; useless); Fl. batava **28**: pl. 2231a. 1932–1934 (*Hericium coralloides*; uncertain); Fries, Sverig. ätl. gift. Svamp. pl. 34. 1862 (*Hydnum coralloides*; good); Kallenbach *in* Z. Pilzk. **11**: pl. 12 upper fig. 1932 (*Hydnum coralloides*; good; lower fig. not identifiable); Leuba, Champ. comest. pl. 38 fig. 1. 1890 (*Hydnum coralloides*; fairly good); Lloyd, Mycol. Writ. **7**: pl. 340 fig. 3229. 1925 (*Hydnum coralloides*; photogr., upside down, indistinct); Michael-Schulz, Führ. Pilzfr. **3**: fig. 310. 1927 (*Dryodon coralloides*; good); Micheli, Nova Pl. Gen. pl. 64 fig. 2. 1729 (*Agaricum esculentum album . . .*; juvenile?); Nikolaeva *in* Pl. cryptog. **5**: fig. 9 (*Hericium coralloides*; good), fig. 10 (*Hericium coralloides* f. *confluens*; good). 1950; Oeder *in* Icon. Pl. Fl. dan. **3**, Fasc. 8: pl. 450. 1769 (*Agaricum esculentum . . .*; recognizable); Patouillard, Tab. anal. Fung., fasc. 4: fig. 357. 1885 (*Hydnum coralloides*; recognizable); Peck *in* Rep. N.Y. State Mus. **48** (3): pl. 24 fig. 11–12. 1894 (*Hydnum coralloides*; fairly good); Ramsbottom, Mushrooms & Toadst., New ed., pl. XVI fig. a. 1954 (*Hydnum coralloides*; photogr., fairly good); Richon & Roze, Atl. Champ. pl. 64 fig. 6–7. 1887 (*Dryodon coralloides*; good); Rolland, Atl. Champ. France pl. 100 fig. 221. 1910 (*Hydnum coralloides*; passable); Ušak *apud* Pilát, Naše Houby **2**: pl. 153. 1959 (*Hericium coralloides*; uncertain); Sowerby, Col. Fig. Engl. Fungi **3**: pl. 252. 1803 (*Hydnum coralloides*; magnificent).

The '*caput-ursi*' form: Fries, Icon. sel. Hym. **1**: pl. 7. 1867 (*Hydnum caput-ursi*; good); Heim, Champ. fig. 47. 1948 (*Hydnum coralloides*; photogr., uncertain); Krieger, Popul. Guide high. Fungi N.Y. State pl. 18. 1935 (*Hydnum caput-ursi*;

uncertain); Peck *in* Mem. N.Y. State Mus. **3** (4): pl. 67 fig. 8–11. 1900 (*Hydnum caput-ursi*; fairly good); A. H. Smith, Mushroom Hunter's Field Guide figs. on pp. 49–50. 1958 (*Hericium caput-ursi*; photogr., uncertain).

HABITAT.—On frondose trees, mainly *Fagus* and *Quercus*.

DISTRIBUTION.—Very rare, with certainty known from one locality only.

ILLUSTRATIVE COLLECTION.—N o o r d - B r a b a n t: Chaam, "Hondsdonk", X 1932, *B. J. J. R. Walrecht* (L).

EXSICCATI.—(Unfortunately, a number of exsiccati received on loan from Copenhagen and Prague cannot be enumerated, since at the time they were studied I did not yet differentiate *H. coralloides* from *H. ramosum*.) Jaap, Fungi sel. exs. 779 (*Hydnum coralloides*; L); Rabenhorst, Herb. mycol., ed. 2, 702 (*Hydnum coralloides*; L, PR; in part also true *H. coralloides*); von Thümen, Mycoth. univ. 1604 (*Hydnum coralloides*; L).

Manina ramosissima Scop. is enumerated among the synonyms only with great reserve, and mainly because of (i) the intricate ramification, and (ii) the words "corpus . . . aculeos parallelos undique emittens." However, the intricate ramification which is a characteristic feature in normally developed *H. ramosum*, may, in Hymenomycetes in general, well be induced by the fruit-body having grown in the dark. Many will be acquainted with the antler-like structures into which Agarics and Polypores collected in caves or mines have developed. Striking figures are among others to be found in C. Mez, Der Hausschwamm, 1908. With these deformations in mind, one might even think of Scopoli's figure as referable to a 'cave-form' of *H. erinaceus*.

In the same way, it is conceivable that the distribution of the spines on the branches is affected by the lack of light.

The choice of the type of *Clavaria cornu-cervi* calls for some comment. This name is to be found in the Index of Paulet's work (Traité des Champignons **2**. 1793), whereas on p. 427 the species is called "Chevelure des arbres blanche." The sentence "Cette espèce que l'Écluse a fait connoître . . ." shows that Paulet chose the first of four illustrations, cited in Traité Champ. **1**: 540, No. 64a, 1790, to serve as an example of his species. These illustrations were enumerated as follows: *25.um genus fungor. pernicios*. Clusii, p. 287, icon. in append. alter.; *Cornu cervi calcinatum* Sterbeeck, tab. 27, fig. G.; *Fungus abietinus niveus* Boccone, Mus. fisic. icon. p. 304; & *fungus ramosus, abietinus, niveus* Barrelier, icon. 1257. However, Paulet's species was not based on Clusius, Rar. Pl. Hist. Fung. Pann. obs. brev. Hist., Appendix alt., fig. on p. cclxxxvii. 1601, but, as may be inferred from his own figure (Atlas pl. 195 fig. 2. 1812–1835; erroneously called *Clavaria hydnoides*), on that by van Sterbeeck (Theatr. Fung. pl. 27 fig. G. 1675). The latter, again, was *not* drawn from nature, but copied from an unpublished water-colour by Clusius. In this relation it seems appropriate to quote Istvánffi (Étud. Comm. Code Escluse 126–127. 1900): ". . . parceque l'auteur [van Sterbeeck] fait usage des descriptions de l'Escluse et qu'on avait cru jusqu'alors qu'il avait fait lui-même tous ses dessins." Clusius's

water-colour was reproduced later on by Istvánffi (Pl. 83), and it is this plate that must be regarded as the type of Paulet's species.

When choosing the correct epithet for the present species, the name *Hydnum abietinum* Schrad. proved a serious rival of *Hydnum ramosum* Bull. Both were validated in 1821, the former by Schleicher, the latter by Mérat. But, while it is known that Mérat's booklet was registered in the week of June 9–15, the date of publication of Schleicher's catalogue which was printed at Chambéry, France, is a matter of conjecture. The only piece of information avalaible as yet is a letter dated December 18th, 1821, written by Schleicher to Dr. Bonjean at Chambéry and preserved in the 'Conservatoire et Jardin Botaniques' at Geneva. I am greatly indebted to Dr. C. E. B. Bonner, Geneva, for having copied the most important part of this letter which reads: "Je vous avise par ces lignes que jusqu'à cette date je n'ai rien encore appercue de ces catalogues . . .. J'aurai beaucoup mieux fait d'envoyer mon MS à Turin." From this it may be inferred that Schleicher's publication is of a later date than Mérat's, and it follows that *Hericium abietinum* (Schrad.) ex Schleich. cannot be used for the present species.

Albertini & Schweinitz (1805) stated their *Hydnum coralloides* var. *heteromorpha* to be just a young stage of the species, i.e. of *Hydnum coralloides*. On the title-page they mentioned that their 'Conspectus' was written "e methodo Persooniana," whilst Persoon's 'Synopsis' is quoted on page iii of the introduction. From this, it may be gathered that the authors treated *H. coralloides* in the same sense as did Persoon, which amounts to their species and variety being nothing but *Hericium ramosum*.

Hydnum caput-ursi, if not considered a species of its own, has usually been thought of in relation with *Hericium coralloides*. This is an error. Both Fries's description and plate sufficiently show *H. caput-ursi* to be connected with *H. ramosum*. What rank should be attributed to '*caput-ursi*' is a question, to which I would rather postpone a definite answer. It seems, however, that there is no sharp boundary line dividing '*caput-ursi*' and '*ramosum*'. The specimen depicted by Nikolaeva under the name of *H. coralloides* f. *confluens* may well represent an intermediate form between both.

A form, corresponding to the '*caput-ursi*' form in *H. ramosum*, also exists in *H. coralloides*. Both have the massive body in common from which there emerge much shortened branches, but they differ in the way the spines are distributed.

Species of doubtful position

The following species have been left out of the present revision, some because I fail to recognize them, another because of its lack of a distinct stipe, which renders it unfit for inclusion in a treatise on stipitate Hydnums.

HYDNUM ABIETIS Hubert

Hydnum abietis Hubert, Outline Forest Pathol. 305. 1931. — *Hericium abietis* (Hubert) Nobles *in* Canad. J. Bot. **36**: 96, Table 3. 1958 (no reference to basinym). — Type: represented by Hubert, Outline Forest Pathol. fig. 71. 1931.

The history of this fungus name is somewhat unusual. As may be gathered from a note by Englerth (1942: 11), it was Weir who collected and studied the fungus, considering "it a new species to which he applied the name *Hydnum abietis*, although he never published it as such. Published reference to the fungus was first made by Hubert . . .." Hubert, in enumerating the Hydnums causing diseases in forest trees, referred to the fungus as "*Hydnum* sp. (*H. abietis*)," but was more definite in the legend to Fig. 71 and on p. 306, using the binomial *Hydnum abietis* without brackets. Since he also supplied a description ("It resembles somewhat *H. coralloides* but has finer teeth. The fruiting bodies are white to cream color and measure from four to ten inches wide and six to twelve inches high."), there is no doubt that the species is to be ascribed to Hubert.

The species was subsequently recognized by Foster & Foster (1951: 491, 492) as belonging to the genus *Hericium* (*Hericium* sp.), while the, not validly published, recombination *Hericium abietis* was used by Nobles (l.c.).

From Hubert's description and photograph I would suggest that his species is identical with *Hericium ramosum*, but as long as no material has been examined, no conclusive proof can be given.

The photograph published by Englerth (1942: pl. 5 fig. 3) is too small to allow identification; the picture in the paper by Foster & Foster (1951: pl. 5 fig. 1) almost certainly represents *H. coralloides*. Dr. R. E. Foster, Victoria, whom I wrote concerning *Hydnum abietis*, supplied me with a number of beautiful specimens considered to be this species from various localities in British Columbia. All collections seem to belong to *Hericium coralloides*; morphologically they are indistinguishable from this species, and the spores are only slightly smaller.

HERICIUM BRESADOLAE (Quél.) Malençon

Clavaria bresadolae Quél., Fl. mycol. 458. 1888; *apud* Bres., Fungi trident. **2**: 40 pl. 146 fig. 2. 1892; not *Clavaria bresadolae* Cavara *in* Atti Ist. bot. Univ. Pavia **3**: 8. 1894. — *Ceratella bresadolae* (Quél.) Bigeard & Guill., Compl. Fl. Champ. sup. France 442. 1913. — *Hericium bresadolae* (Quél.) Malençon *in* Bull. Soc. mycol. France **73**: 321 fig. 8. 1958; not *Hydnum bresadolae* Quél. *apud* Bres., Fungi trident. **1**: 14. 1881. — Type locality: France.

There is no doubt that the present species is in its proper place in the genus *Hericium*. However, the unobtrusiveness of the root by which the specimens are fastened to the substratum, and, contrasted with it, the conspicuousness of the subiculum, make it difficult for *H. bresadolae* to be retained in a paper which deals with the stipitate species.

HERICIUM CAUCASICUM Sing.

Hericium caucasicum Sing. *in* Beih. bot. Centralbl. **46** (Abt. 2): 77. 1930. — *Hericium alpestre* f. *caucasicum* (Sing.) Nikol. *in* Pl. cryptog. **5**: 336. 1950. — Type locality: U.S.S.R., Caucasus.

Nikolaeva gave an illustration of *Hericium alpestre* f. *caucasicum* (l. c., fig. 3), apparently drawn from a specimen determined as *H. caucasicum* by Singer (l. c., p. 328). Since Nikolaeva's description in some respects (length of the basal part of the

fruit-body, and size of the spores) deviates from the original one, allowance should be made for the possibility of this specimen not being conspecific with the type. The former might be a form of *Hericium coralloides*; where to place the latter is even less certain (see p. 121).

MANINA MUSCOIDES Scop.

Manina muscoides Scop., Diss. Sci. nat. **1**: 99. 1772; not *Hydnum muscoides* Schum., Enum. Pl. Saelland. **2**: 394. 1803 = *Hericium ramosum*; not *Hydnum muscoides* Lloyd, Mycol. Writ. **7**: 1227. 1923. — *Hericium muscoides* (Scop.) Pers., Comm. Fung. clav. 26. 1797. — *Hericium muscoides* (Scop.) *ex* Pers., Mycol. europ. **2**: 152. 1825. — Type: represented by Scopoli, Diss. Sci. nat. **1**: pl. 16. 1772.

There is no certainty to be had as to what species *Manina muscoides* might be attributed.

HERICIUM PTYCHOGASTEROIDES Nikol.

Hericium ptychogasteroides Nikol. *in* J. Bot. U.S.S.R. **41**: 999. 1956. — Type locality: U.S.S.R., "regio Primorskensis."

In the description, a copy of which I received thanks to the kindness of Mr. D. A. Reid, Kew, Nikolaeva stated that her species is based on an imperfect, i.e. conidia-bearing, state. It is difficult, if possible at all, to ascertain to which species the corresponding perfect state would belong, but with Boudier's plate in mind, *H. ptychogasteroides* may possibly be thought of as the conidial state of *H. erinaceus*.

HYDNUM L. ex Fr.

Hydnum L., Sp. Pl. **2**: 1178. 1753. — *Hypothele* Paul., Mycétol. 43, 47. circa 1812 (avowed name change); *ex* Banker *in* Torreya **4**: 113. 1904. — *Hydnum* L. *ex* Fr., Syst. mycol. **1**: lvi, 397. 1821; Elench. Fung. **1**: 129. 1828; Epicr. Syst. mycol. 505. 1838; Hym. europ. 598. 1874; not *Hydnum* S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 650. 1821 ("Dill.") = *Sarcodon* P. Karst. — *Hydnum* sect. *Hydnum* (L. ex Fr.) L. March. *in* Bijdr. natuurk. Wetensch. **3** (1): 269. 1828 (nomen nudum); Beeli *in* Bull. Natur. Belg. **14**: 14 (reprint). 1933. — Type species: *Hydnum repandum* L. ex Fr., see Donk (1956: 97).

Hydnum trib. *Mesopus* Fr., Syst. mycol. **1**: 398. 1821; Elench. Fung. **1**: 130. 1828; Epicr. Syst. mycol. 505. 1838; Hym. europ. 598. 1874. — *Hydnum* sect. *Hydnois* [subsect.] *Mesopus* (Fr.) Duby, Bot. gall., Ed. sec., **2**: 775. 1830. — *Hydnum* sect. *Mesopus* (Fr.) Sacc. *in* Fl. ital. cryptog. **1** (Fasc. 15): 1075, 1078. 1916. — Type species: *Hydnum repandum* L. ex Fr. (selected).

Dentinum S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 650. 1821 ("Micheli"). — Type species: *Hydnum repandum* L., see Donk (1956: 75).

Hydnum sect. *Hydnois* Duby, Bot. gall., Ed. sec., **2**: 775. 1830. — Type species: same as of *Hydnum* L. ex Fr. (selected).

Hydnum trib. *Mesopus* [sect.] *Carnosa* Fr., Epicr. Syst. mycol. 505. 1838; Hym. europ. 598. 1874. — *Hydnum* sect. *Mesopus* subsect. *Carnosa* (Fr.) Sacc. *in* Fl. ital. cryptog. **1** (Fasc. 15): 1075, 1078. 1916. — Type species: *Hydnum repandum* L. ex Fr. (selected).

Tyrodon P. Karst. *in* Rev. mycol. **3** (No. 9): 19. Jan. 1, 1881; *in* Acta Soc. F. Fl. fenn. **2** (1): 33. 1881 & *in* Medd. Soc. F. Fl. fenn. **6**: 15. 1881. — *Hydnum* [sect.] *Tyrodon* (P. Karst.) J. Schroet. *in* Cohn, Kryptog.-Fl. Schles. **3** (1): 455. 1888. — *Hydnum* sect. *Mesopus* [subsect.] *Carnosa* [ser.] *Tyrodon* (P. Karst.) Killerm. *in* Nat. Pflfam., Zweite Aufl., **6**: 166. 1928. — Type species: *Hydnum repandum* L. ex Fr., see Donk (1956: 112).

Carpophores terrestrial, stipitate, fleshy. Pileus covered with tomentum, anoderm. Stipe finely tomentose, glabrescent. Context homogeneous, not zonate. Hymenium covering spines on underside of pileus. Spines white to more or less coloured like the pileus. Basidia (in *H. repandum*) (3–)4–5(–6)-spored. Spores subglobose to obovoid, smooth, white in mass.

The American species of the genus have not been taken into consideration. I am not, therefore, in the position to say whether the presence of clamp connections, as found in *H. repandum*, may be regarded as a generic character, and also not whether the spores in general only number four per basidium, as stated by Coker & Beers for some of the species. Incidentally, it may be of interest to note that already R. Maire (1902: 96) found the basidia of *H. repandum* to be 3–5-spored.

In recent times an Australian and New Zealand species was redescribed under the name of *Dentinum crocidens* (Cooke) G. H. Cunn. (*in* Trans. Roy. Soc. New Zealand **85**: 589. 1958). If this is a true *Hydnum*, it would prove the genus to contain also species without clamp connections.

The genus *Hydnum* is in need of a more thorough revision, covering a wider area than could for the present be accomplished. The specimens which in Europe are generally called *Hydnum repandum* and/or *H. rufescens* may well prove to be referable to several more well-defined taxa. In this connection it seems appropriate to point out that Schatteburg (1956: 316) reported on the repulsive, rancid taste of Southern German specimens of *Hydnum repandum* once they had been dried, whereas drying did not change the culinary quality of the Northern German specimens of (supposedly) the same species. However, with my limited experience of European Hydnums, I can as yet recognize but two species, viz. the highly variable *Hydnum repandum* and *Sarcodon abietinus* Heim. For the latter the following new name is proposed, since on transferring the species to the genus *Hydnum*, the recombination would result in a later homonym.

Hydnum heimii Maas G., *nom. & spec. nov.*

Sarcodon abietinus Heim *in* Rev. Mycol. **8** (1, Suppl.): 10. 1943 ("*abietinum*", basinym, no Latin description); *in* Bull. Soc. mycol. France **67** (Atlas): pl. 99. 1952 ("*abietum*", no Latin description); Champ. Europe **2**: 62. 1957 (no Latin description); not *Hydnum abietinum* (Pers.) Duby, Bot. gall., Ed. sec., **2**: 778. 1830; not *Hydnum abietinum* Schrad. *ex* Oudem., Enum. syst. Fung. **2**: 629. 1920 = *Hericium ramosum*, see there. — Type: not seen (PC).

Pileus carnosus, e convexo planus vel depressus, scrobiculatus, superficie tomentosa, tempore humido subviscosa, cremeo-albus vel hinc inde ochraceus, centro olivaceo-luteolo. Stipes subcentralis, compactus, basi incrassatus interdum bulbosus, velutinus, luteolus, apice scrobiculato-tomentosus, parte basali ochracea. Aculei fragilissimi, perlongi, curvati, plus minusve decurrentes, cremeo-roseoli, fistulosi vel medulla subviridi farcti. Caro alba, flavescens, e hyphis fibulatis formata, sapore amarescente. Basidia clavata, gloeocystidiis basidiisque sterilibus deformatis immixta, sterigmata 4 vel interdum 5 gerentia. Sporae obovoideae, apiculatae, hyalinae.

Provenit haec species in Gallia, Grignon, autumno in foliis dejectis *Piceae excelsae*.

The type material which is assumed to be preserved in Prof. Heim's herbarium could not be obtained on loan, but the author very kindly gave me a specimen collected at the type locality in 1953. Some data of the microscopical part in the above description have been taken from this specimen.

The species evidently differs from *Hydnum repandum* in the olivaceous colour of the centre of the pileus, in the surface of the pileus becoming viscid when moist, in the longer spines, and in the narrower spores.

HYDNUM REPANDUM L. ex Fr.

Hydnum repandum L., Sp. Pl. **2**: 1178. 1753. — *Hypothele repanda* (L.) Paul., Icon. Champ. pl. 35 fig. 1–2. 1812 1835. — *Hydnum repandum* L. *ex* Fr., Syst. mycol. **1**: 400. 1821; Elench. Fung. **1**: 130. 1828; Epicr. Syst. mycol. 506. 1838; Hym. europ. 601. 1874. — *Dentinum repandum* (L. ex Fr.) S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 650. 1821. — *Tyrodon repandus* (L. ex Fr.) P. Karst. *in* Rev. mycol. **3** (No. 9): 19. Jan. 1, 1881; *in* Acta Soc. F. Fl. fenn. **2** (1): 33. 1881 & *in* Medd. Soc. F. Fl. fenn. **6**: 15. 1881. — *Sarcodon repandus* (L. ex Fr.) Quél., Ench. Fung. 189. 1886; Fl. mycol. 446. 1888 ("*repandum*"). — *Hypothele repanda* (L. ex Fr.) Banker *in* Torreya **4**: 113. 1904. — Type locality: Sweden, "Habitat in vastis sylvis rarius" (Linn., Fl. suec. 383. No. 1098. 1745).

Hydnum rufescens Schaeff., Fung. Icon. **4**: 95. 1774; not *Hydnum rufescens* (Pers.) Poiret, Encycl. méth. (Bot.) **8**: 206. 1808 = *Heteroporus biennis* (Bull. ex Fr.) Laz.; not *Hydnum rufescens* Fr., Syst. mycol. **1**: 401. 1821. — *Hydnum persoonii* Poiret, Encycl. méth. (Bot.) **8**: 204. 1808 (name change). — *Hydnum repandum* var. *denudatum* [f.] b. *rufidum* Fr., Obs. mycol. **1**: 139. 1815 (name change). — *Dentinum rufescens* (Schaeff.) *ex* S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 650. 1821; not *Dentinum rufescens* (Fr.) Pouz. *in* Česka Mykol. **10**: 76. 1956. — Type locality: Germany, Bavaria.

Hydnum flavidum Schaeff., Fung. Icon. **4**: 99. 1774; not *Hydnum flavidum* Lloyd, Mycol. Writ. **6**: 957. 1920. — *Hydnum repandum* var. *denudatum* [f.] a. *flavidum* (Schaeff.) Fr., Obs. mycol. **1**: 138. 1815. — *Hydnum repandum* var. *flavidum* (Schaeff.) *ex* Harzer, Naturgetr. Abb. essb. gift. verd. Pilze 112. 1842. — Type: represented by Schaeff., Fung. Icon. **4**: pl. 318. 1774.

Hydnum squamosum Schaeff., Fung. Icon. **4**: 99. 1774; not *Hydnum squamosum* Bull., Herb. France pl. 409. 1788; Hist. Champ. France 310. 1791 = *Hydnellum* sp. indet. — *Hydnum repandum* var. *squamosum* (Schaeff.) Fr., Obs. mycol. **1**: 139. 1815. — [*Hydnum repandum* var. b. Fr., Syst. mycol. **1**: 400. 1821] *Hydnum squamosum* Schaeff. *ex* Fr., Epicr. Syst. mycol. 505. 1838; Hym. europ. 598. 1874 (misapplied); not *Hydnum squamosum* Bull. *ex* G. F. Re, Fl. pedemont. Append. 50. 1821. — *Sarcodon squamosus* (Schaeff. ex Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 103. 1882. — *Phaeodon squamosus* (Schaeff. ex Fr.) P. Henn. *in* Nat. Pflfam. **1** (1**): 149. 1898. — Type: represented by Schaeff., Fung. Icon. **3**: pl. 273. 1770.

Hydnum carnosum Batsch, Elench. Fung. 111. 1783 (in part); Elench. Fung. Cont. prima 197. 1786; not sensu Gmel., Syst. veg. 2: 1438. 1791 = *Hydnum repandum* var. *repandum*; not *Hydnum carnosum* (Banker) Trott. apud Sacc., Syll. Fung. **23**: 472. 1925 = *Bankera carnosa* (Banker) Snell, Dick & Taussig. — Type locality: Germany, surroundings of Jena.

Hydnum clandestinum Batsch, Elench. Fung. 113, 177. 1783; not sensu Gmel., Syst. veg. **2**: 1439. 1791 = *Pseudohydnum gelatinosum* (Scop. ex Fr.) P. Karst. — *Hydnum repandum* var. *clandestinum* (Batsch) *ex* Kickx, Fl. cryptog. Flandres **2**: 251. 1867. — Type: represented by Batsch, Elench. Fung. pl. 10 fig. 44. 1783.

Hydnum medium Pers., Obs. mycol. **2**: 97. 1799. — *Hydnum repandum* var. *denudatum* [f.] c. *albidum* Fr., Obs. mycol. **1**: 139. 1815 (name change). — Type locality: Germany.

Hydnum bicolor Raddi *in* Mem. Mat. Fis. Soc. ital. Sci. **13** (2): 353. 1807; not *Hydnum bicolor* Alb. & Schwein., Consp. Fung. 270. 1805. — Type: represented by Raddi *in* Mem. Mat. Fis. Soc. ital. Sci. **13** (2): pl. 12 fig. 6. 1807.

Hydnum bulbosum Raddi *in* Mem. Mat. Fis. Soc. ital. Sci. **13** (2): 353. 1807. — Type

represented by Raddi *in* Mem. Mat. Fis. Soc. ital. Sci. **13** (2): pl. 12 fig. 7. 1807.

Hydnum pallidum Raddi *in* Mem. Mat. Fis. Soc. ital. Sci. **13** (2): 353. 1807; not *Hydnum pallidum* Cooke & Ellis *in* Grevillea **9**: 103. 1881. — Type: represented by Raddi *in* Mem. Mat. Fis. Soc. ital. Sci. **13** (2): pl. 12 fig. 8. 1807.

Hydnum roseum Raddi *in* Mem. Mat. Fis. Soc. ital. Sci. **13** (2): 354. 1807; not *Hydnum roseum* Saut. *apud* Schiederm. *in* Österr. bot. Z. **27**: 6. 1877 (nomen nudum). — Type: represented by Raddi *in* Mem. Mat. Fis. Soc. ital. Sci. **13** (2): pl. 9 fig. 3. 1807.

Hydnum repandum var. *denudatum* Fr., Obs. mycol. **1**: 138. 1815. — Type: same as of *Hydnum repandum* L.

Hydnum repandum var. *intermedium* Fr., Obs. mycol. **1**: 139. 1815. — Type locality: Sweden.

Hydnum album Pers., Traité Champ. comest. 249. 1818; *ex* Steud., Nomencl. bot. 202. 1824; Pers., Mycol. europ. **2**: 159. 1825; not *Hydnum album* Fr., Obs. mycol. **1**: 148. 1815. — Type: represented by Micheli, Nova Pl. Gen. pl. 72 fig. 2. 1729.

[*Hydnum rufescens* Schaeff. sensu Pers., Obs. mycol. **2**: 95. 1799; Syn. meth. Fung. **2**: 555. 1801] *Hydnum rufescens* Fr., Syst. mycol. **1**: 401. 1821; not *Hydnum rufescens* Schaeff., Fung. Icon. **4**: 95. 1774 = *Hydnum repandum* [var. *repandum*], acc. to Fr., l.c.; not *Hydnum rufescens* (Pers.) Poiret, Encycl. méth. (Bot.) **8**: 206. 1808 = *Heteroporus biennis* (Bull. ex Fr.) Laz. — *Hydnum repandum* var. *rufescens* (Fr.) Barla, Champ. Prov. Nice xlviii, 81, 1859; Peck *in* Rep. N.Y. State Mus. **48**: 406. 1896. — *Hydnum repandum* subsp. *H. rufescens* (Fr.) Fr., Hym. europ. 601. 1874. — *Tyrodon repandus* subsp. *T.* ("*F.*") *rufescens* (Fr.) P. Karst. *in* Rev. mycol. **3** (No. 9): 19. Jan. 1, 1881; *in* Acta Soc. F. Fl. fenn. **2** (1): 33. 1881 & *in* Medd. Soc. F. Fl. fenn. **6**: 15. 1881. — *Sarcodon repandus* var. *rufescens* (Fr.) Quél., Ench. Fung. 189. 1886. — *Tyrodon rufescens* (Fr.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **48**: 349. 1889. — *Dentinum rufescens* (Fr.) Pouz. *in* Česká Mykol. **10**: 76. 1956; not *Dentinum rufescens* (Schaeff.) *ex* S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 650. 1821. — *Sarcodon rufescens* (Fr.) Heim, Champ. Europe **2**: 62. 1957 (incomplete reference to basinym). — Type: non-existing. — Type locality: Germany.

Hydnum diffractum Berk. *in* London J. Bot. **6**: 323. 1847; *in* Grevillea **1**: 71. 1872. — Type: Ohio, Waynesville, Aug. 26. 1844. J. G. Lea (K).

Hydnum rufescens var. (*undulato-*)*repandum* Kickx, Fl. cryptog. Flandres **2**: 251. 1867. — Type locality: Belgium, Flandres.

Sarcodon repandus var. *albus* Quél., Fl. mycol. 447. 1888 ("*repandum* var. *album*"). — *Hydnum repandum* var. *album* (Quél.) Rea, Brit. Basidiomyc. 630. 1922. — Type locality: France.

Hydnum repandum var. *aurantium* Schwalb, Buch d. Pilze 170. 1891. — *Hydnum aurantium* (Schwalb) Schwalb *in* Lotos **13**: 49. 1893; not *Hydnum aurantium* Rafin. *ex* Steud., Nomencl. bot. 202. 1824. — Type locality: Austria?

Sarcodon repandus var. *serotinus* Quél. *apud* Bourd. *in* Rev. sci. Bourbon. Centre France **11**: 233. 1898 ("*repandum* var. *serotinum*"). — *Hydnum repandum* var. *serotinum* (Quél. apud Bourd.) Bourd. & Galz. *in* Bull. Soc. mycol. France **30**: 280. 1914; Hym. France 445. 1928. — Type locality: France, environment of Moulins.

Sistotrema cavinae Vel., České Houby **4–5**: 737. 1922 (Latin descr. by Pilát *in* Op. bot. čech. **6**: 270. 1948). — Type: not seen (PRC).

Hydnum rufescens var. *avellanae* Vel., České Houby **4–5**: 752. 1922. — Part of type: *Hydnum rufescens* var. *avellanae* Vel., Bohemia centr., distr. Říčany u Prahy apud pag. Mnichovice, IX 1918, leg. *Velenovský* (PRC).

Hydnum brunnescens Vel., České Houby **4–5**: 753. 1922 (Latin descr. by Pilát *in* Op. bot. čech. **6**: 275. 1948). — Syntype: *Hydnum brunnescens* Vel., Bohemia centr., distr. Říčany u Prahy apud pag. Mnichovice, VIII 1914, leg. *Velenovský* (PRC).

Hydnum repandum var. *albidum* Cejp *in* F. Fl. čechoslov. **2**: 82. 1928; *in* Bull. internat. Acad. Sci. Bohême **31**: 304. 1930. — Type: *Hydnum repandum* var. *albidum* Cejp, Bohemia centr., distr. Říčany u Prahy, in pineto apud pag. Hrusice, IX 1925, leg. *Velenovský* (PRC).

Hydnum repandum var. *album* Kawamura, Jap. Fungi No. 188. date? (nomen nudum?, see Kawamura, Icon. Jap. Fungi **6**: 609. date?). — Type: not known to be in existence. — Type locality: Japan.

DIAGNOSTIC CHARACTERS.—Carpophores solitary or concrescent. Pileus convex, becoming plane or depressed, surface velvety to finely woolly-felted, glabrescent from centre outwards from collapsing tomentum and becoming somewhat shiny, white, pale flesh colour, salmon or fulvous-orange, margin involute when young, entire or deeply indented, later on expanding, finally undulate. Stipe central to excentric, slender to stocky, equal or fusiform to broadened downwards, minutely tomentose, glabrescent and becoming somewhat shiny with age, cottony at the base from strongly developed mycelial mass, paler than pileus to whitish, ochraceous to rusty yellow-brown at the base and when bruised. Spines lacking in a concentrical zone around top of stipe, or decurrent, white or flesh-coloured when young, nearly concolorous with cap at maturity. Context thick, white in pileus, slowly turning yellowish orange or flesh, yellowish to brownish yellow in base of stipe. Odour indistinct. Taste mild or somewhat acrid or bitter. Hyphae with clamp connections.

Var. REPANDUM

Hydnum repandum L., l.c.
Hydnum rufescens Schaeff., l.c.
Hydnum flavidum Schaeff., l.c.
? *Hydnum squamosum* Schaeff., l.c.
Hydnum clandestinum Batsch, l.c.
Hydnum medium Pers., l.c.
Hydnum bicolor Raddi, l.c.
Hydnum bulbosum Raddi, l.c.
Hydnum roseum Raddi, l.c.
Hydnum repandum var. *denudatum* Fr., l.c.
Hydnum repandum var. *intermedium* Fr., l.c.
Hydnum diffractum Berk., l.c.
Hydnum rufescens var. (*undulato-*)*repandum* Kickx, l.c.
Hydnum repandum var. *aurantium* Schwalb., l.c.
Sistotrema cavinae Vel., l.c.
Hydnum rufescens var. *avellanae* Vel., l.c.

MISAPPLICATION. — *Hydnum imbricatum* sensu Bolt., Hist. Fung. Halifax **2**: 88. 1788; not *Hydnum imbricatum* L., Sp. Pl. **2**: 1178. 1753 = *Sarcodon imbricatus*.

DESCRIPTION.—Donk *in* Med. Nederl. mycol. Ver. **22**: 15. 1933 (*H. repandum*).

ILLUSTRATIONS.—(Except where mentioned otherwise, all given as *Hydnum repandum*.) Atkinson, Mushrooms fig. 187. 1900; second ed., fig. 198. 1901 (photogr.; good); Badham, Escul. Fung. England pl. 12 fig. 3. 1847 (passable); Barla, Champ. Prov. Nice pl. 39 fig. 1–9. 1859 (passable); Batsch, Elench. Fung. pl. 10 fig. 44. 1783 (*Hydnum carnosum*; mediocre); Bel, Champ. sup. Tarn pl. 7. 1889 (passable); Bresadola, Icon. mycol. **21**: pl. 1044 (good), pl. 1046 (*Hydnum rufescens*; good). 1932; Bulliard, Herb. France pl. 172. 1783 (good); Coker *in* J. Mitchell sci. Soc. **34**: pl. 2. 1919 (photogr.); Coker & Beers, Stip. Hydn. east. U.S. pl. 11. 1951 (photogr.); Cordier, Champ., Quatr. éd., pl. 43. 1876 (good); Dumée, Nouv. Atl. Champ. comest. vén., Deux. éd., pl. 52. 1909 (fairly good); Favre-Guillarmod, Champ. comest. **1**: pl. facing p. 43. 1869 (fairly good); Fl. batava **18**: pl. 1430. 1889 (fairly good); Fries, Sverig. ätl. gift. Svamp. pl. 15. 1860 (good); Gillet, Champ. France pl. 322 (fairly good), 323 (*Hydnum rufescens*; fairly good). 1878–1890; Gramberg, Pilze Heimat **2**: pl. 29. 1913 (good); Greville, Scot. cryptog. Fl. **1**: pl. 44. 1823

(good); Haas & Gossner, Pilze Mitteleurop. Speisepilze **1**: pl. 35. 1951 (good); Harzer, Naturgetr. Abb. essb. gift. verdächt. Pilze pl. 23 (mediocre), 64 (*Hydnum repandum* var. *flavidum*; mediocre). 1842; Hussey, Illustr. Brit. Mycol. **1**: pl. 16. 1847 (good); Jaccotet & Robert, Champ. dans la Nature, Quatr. éd., pl. 64. 1948 (good); Jahn, Pilze rundum pl. 1 fig. 5. 1949 (fairly good); Kawamura, Icon. Jap. Fungi **6**: fig. 606. date? (uncertain); Krombholz, Naturgetr. Abb. Beschr. essb. Schw. **7**: pl. 50 fig. 1–9. 1841 (fairly good); Lenz, Abb. nützl. schädl. Schw. pl. 12 fig. 51. 1831 (good); Leuba, Champ. comest. pl. 37 fig. 1–4. 1890 (good); Lorinser, Essb. verdächt. gift. Schw., 3 Aufl., pl. 3 fig. 5. 1883 (good); Maublanc, Champ. France, Quatr. éd., **2**: pl. 192 (larger specimens). 1952 (good); Michael-Schulz, Führer Pilzfr. **1**: pl. 100. 1927 (good except for colour); Nannfeldt & Du Rietz, Vilda Växter i Norden, Andra revider. och komplett. upplagan, pl. 123. 1952 (good); Pabst, Cryptog.-Fl. **2**: pl. 22. 1875 (passable); Peck *in* Rep. N.Y. State Mus. **48**: pl. 38. 1895 (stipe somewhat slender); Pilát & Ušák, Naše Houby pl. 15. 1952 (good); Richon & Roze, Atl. Champ. pl. 65 fig. 1–3. 1888 (passable); Rolland, Atl. Champ. France pl. 100 fig. 222. 1910 (good); Roques, Hist. Champ. pl. 2 fig. 2. 1832 (passable); Schaeffer, Fung. Icon. **2**: pl. 141 fig. 1, 4–10. 1763 (*Hydnum rufescens*; good); **4**: pl. 318. 1770 (*Hydnum flavidum*; passable); Schwalb, Buch d. Pilze pl. 14 fig. 6. 1891 (passable); Schwalb *in* Lotos **13**: 49. 1893 (*Hydnum aurantium*; passable); A. H. Smith, Mushroom Hunter's Field Guide fig. on p. 53. 1958 (photogr.; good); Sowerby, Col. Fig. Engl. Fungi **2**: pl. 17. 1799 (good); Thijsse, Paddestoelen pl. 64. 1929 (fairly good); Trog, Schw. d. Wald. pl. 7 fig. 4–5. 1848 (passable); Velenovský, České Houby **4–5**: pl. 129 fig. 1. 1922 (*Sistotrema cavinae*; upside-down, anomalous); Vittadini, Descr. Fung. mang. Ital. pl. 25 fig. 2. 1835 (zones on pileus incorrect); Wakefield & Dennis, Common Brit. Fungi pl. 103 fig. 4. 1950 (passable); Walty, Schweiz. Pilztaf. **3**: pl. 63. 1947 (good); Zeitlmayr, Knaurs Pilzb. fig. 61. 1955 (good).

DIAGNOSTIC CHARACTERS.—Pileus pale flesh or pale salmon to bright orange. Stipe excentric, stocky. Spines usually stopping at some distance from the stipe. Taste more or less bitter (somewhat acrid, according to Barla, Champ. Prov. Nice 80. 1859).

HABITAT.—On humous or clayey, subacid to probably even basic soils in deciduous woods, especially of *Quercus*, less frequently also under *Pinus*.

DISTRIBUTION.—Known from various parts of the country, including the dunal region, but not common.

ILLUSTRATIVE COLLECTION.—G e l d e r l a n d: Rheden, De Steeg, "Middachten", 7 IX 1957, *Maas G. 12362* (L).

EXSICCATI.—(All given under the name of *Hydnum repandum*.) Brinkmann, Westfäl. Pilze, Lief. 2: 96 (K, L); Klotzsch, Herb. viv. mycol. 229 (L); Kryptog. exs. vindob. 314 (K, L, PR); Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. 354 (C, PR); Petrak, Fl. Bohem. Morav. exs., ser. 2 (1): 6, 48 (PR); Rabenhorst, Herb. mycol. 9 (L); Saccardo, Mycoth. ital. 810 (L, PR); Sydow, Mycoth. germ. 1307 (C, K, L, PR).

Var. RUFESCENS (Fr.) Barla

Hydnum carnosum Batsch, l.c.
Hydnum rufescens Fr., l.c.
? *Sarcodon repandus* var. *serotinus* Quél. apud Bourd., l.c.
MISAPPLICATION.—*Hydnum repandum* sensu Bolt, Hist. Fung. Halifax **2**: 89. 1788.

DESCRIPTION.—Persoon, l.c.
ILLUSTRATIONS.—Barla, Champ. Prov. Nice pl. 39 fig. 10–12. 1859 (*Hydnum repandum* var. *rufescens*; good; scales on pileus exaggerated?); Batsch, Elench. Fung. Cont. prima pl. 26 fig. 136. 1786 (*Hydnum carnosum*; fairly good); Maublanc, Champ. France, Quatr. éd., **2**: pl. 192 (smaller specimen). 1952 (*Hydnum repandum* var. *rufescens*; good); Patouillard, Tab. anal. Fung. **2**: fig. 147. 1883 (*Hydnum repandum* var. *rufescens*; good); Persoon, Icon. pict. pl. 19 fig. 1. 1803–1806 (*Hydnum rufescens*; fairly good); Richon & Roze, Atl. Champ. pl. 65 fig. 5–6. 1888 (*Hydnum rufescens*; fairly good); Schaeffer, Fung. Icon. **2**: pl. 141 fig. 2–3. 1763 (*Hydnum rufescens*; good).

DIAGNOSTIC CHARACTERS.—Pileus fulvous-orange. Stipe central, slender. Spines often decurrent. Taste stated to be mild (Huber *in* Z. Pilzk. **9**: 148. 1930) or acrid (Richon & Roze, Atl. Champ. 209. 1888).

HABITAT.—Probably the same as of var. *repandum*.
DISTRIBUTION.—Definitely rare.
ILLUSTRATIVE COLLECTION.—Gelderland: Rheden, De Steeg, "Middachten", 8 IX 1957, *Maas G. 12372* (L).
AUTHENTIC MATERIAL.—*Hydnum rufescens*, Gallia (L 910.263–1347); *Hydnum rufescens*. var. *H. repandi*?, ex Calabria? (L 910.263–1336); *Hydnum rufescens*, misit Mougeot (L 910.262–635).
EXSICCATI.—Kavina & Hilitzer, Cryptog. čechoslov. exs. 250 (*Hydnum repandum* var. *rufescens*; PR); Kryptog. exs. vindob. 315 (*Hydnum rufescens*; L, PR); Lundell & Nannfeldt, Fungi exs. suec. praes. upsal. 355 (*Hydnum rufescens*; C, PR).

Var. ALBUM (Quél.) Rea

Hydnum pallidum Raddi, l.c.
? *Hydnum album* Pers., l.c.
Sarcodon repandus var. *albus* Quél., l.c.
Hydnum brunnescens Vel., l.c.
Hydnum repandum var. *albidum* Cejp, l.c.
Hydnum repandum var. *album* Kawamura, l.c.
MISAPPLICATION.—*Hydnum repandum* var. *albidum* (Peck) Bres., Icon. mycol. **21**: text to pl. 1045. 1932 (see Coker & Beers, Stip. Hydn. east. U.S. 18. 1951).

DESCRIPTIONS.—Coker & Beers, Stip. Hydn. east. U.S. 17. 1951; Quélet, l.c.
ILLUSTRATIONS.—Bresadola, Icon. mycol. **21**: pl. 1045. 1932 (*Hydnum repandum* var. *albidum*); Coker *in* J. Mitchell sci. Soc. **41**: pl. 55. 1926 (*Hydnum albidum*); Kawamura, Icon. Jap. Fungi **6**: fig. 607. date? (*Hydnum repandum* var. *album*).

DIAGNOSTIC CHARACTERS.—White to creamy in all parts.

HABITAT.—Said to occur in woods.
EXSICCATI.—None.

Of the varieties of *Hydnum repandum* accepted in the present paper, var. *rufescens* is no doubt the most disputed one from a taxonomical point of view. From what I have seen of living material during a short stay in France, I am inclined to regard '*rufescens*' as a variety, with the understanding that even so there may be cases in which it is difficult to place the specimens.

Nomenclaturally, var. *rufescens* is equally difficult. In his 'Observationes' Persoon cited the following synonyms under *Hydnum rufescens*, (1) *Hydnum repandum* Bolt. (wrong number of plate), with the annotation "hujus loci est," (2) *Hydnum carnosum* Batsch, with a question-mark since, apparently, he considered the stipe [too] heavy, and (3) *Hydnum rufescens* Schaeff., pl. 141 fig. 2–3, also with a question-mark. From these quotations it is clear that Persoon, although adopting Schaeffer's specific epithet, had a very definite idea as to how *H. rufescens* should be conceived, which is exemplified by the material in his herbarium. He excluded most of the figures of Schaeffer's plate, referring them to *H. repandum*. One might, therefore, speak of *Hydnum rufescens* Schaeff. sensu Persoon, the type of which would be represented by Schaeffer's Plate 141 fig. 2–3.

Fries (1821: 401) adhered to Persoon's views, which is evidenced by the fact that his diagnosis of *Hydnum rufescens* is almost word for word identical with Persoon's, but, most unfortunately, he excluded the latter's type by citing Schaeffer's plate in its entirety under *H. repandum*. Thus, Fries described a different species, based on a different type. Since he referred to Persoon, this type should be sought with the latter. In Herb. Persoon there are three sheets containing eight specimens, seven of which agree very well with the figures 2 and 3 of Schaeffer's plate. None of these specimens, however, represent the type since the collections (two from France, one probably from Calabria, Italy) were received by Persoon at a time long after his 'Observationes' had been published. Therefore, although the specimens, authenticated by the author, embody Persoon's conception of *Hydnum rufescens*, there seems no solution left, other than to state that there is no type, Germany being the type locality.

Von Keissler (*in* Ann. naturhist. Hofmus. **31**: 108. 1917) who reported on his revision of the fungi of Sauter's herbarium, pointed out that, although *Hydnum roseum* Saut. was quoted by Schiedermayr (*in* Österreich. bot. Z. **27**: 6. 1877), no publication of the name could be traced. Obviously, *H. roseum* is a herbarium name.

For the sake of completeness var. *album* has been included in the present paper, but no finds have ever been recorded for this country. *Hydnum album* Pers. has tentatively been ranged here, but it is impossible to extract conclusive proof from the meagre description, and Micheli's figure to which Persoon refers is of no great help.

Previous to Persoon, Fries had also published a *Hydnum album*, equally based on Micheli's figure. From the fact that no reference was made to Fries, it may be derived that Persoon published his species independently. It is significant that, while Persoon gave a description of his own, and definitely rejected the idea expressed by Haller and Linnaeus of *H. album* being a variety of *H. imbricatum*, Fries only referred to Micheli's description, having no opinion of his own.

Hydnum squamosum Schaeff., on the identity of which I was very much in doubt on an earlier occasion (1956: 57), may very well represent a small, squat form of var. *repandum* hampered in its growth by drought. The colour of the pileus in Schaeffer's plate, as I could ascertain on French material, is by no means unusual, while its ruptured surface suggests the result of a spell of dry weather.

Hydnum diffractum Berk., of which I could study the type thanks to the gracious permission of the Director of the Kew Herbarium, is identical with *Hydnum repandum* var. *repandum*. The general habitus of the fruit-body, the colour and texture of the pileus, the hyaline, broadly ellipsoid spores measuring 7–8 × 5.5–6 μ, and the clamped hyphae prove its identity.

The very short description of *Sarcodon repandus* var. *serotinus*, "Roussâtre; stipe grêle, farci; hyménium déprimé autour du stipe," makes it difficult to decide where this variety should be placed. I chose var. *rufescens* as its nearest relative on account of its slender stipe.

On the strength of an annotation by Pilát (1942: 473, and 1952: text to pl. 15), *Sistotrema cavinae* Vel. is reduced to synonymy as it is nothing but an anomalous form of var. *repandum*.

The type specimen of *Hydnum rufescens* var. *avellanae* which is a fragment of the pileus taken from the marginal region, is pale yellowish. From this it would seem that var. *avellanae* is better placed with var. *repandum*, even if it is true that Velenovský described the fruit-body as having the spines decurrent on a slender stipe.

Various older authors cited '*Hydnum sinuatum* Bull.' under the synonymy of *Hydnum repandum*. The quotation is incorrect, Bulliard never used this epithet. No doubt, however, the error finds its source in the fact that Bulliard apart from the Latin name also mentioned "Hydne sinué" which is the French name for the species.

SISTOTREMA Fr. em. Donk

Sistotrema Fr., Syst. mycol. **1**: 426. 1821; Elench. Fung. **1**: 141. 1828; Epicr. Syst. mycol. 520. 1838; Hym. europ. 618. 1874; em. Donk *apud* D. P. Rogers *in* Univ. Iowa Stud. nat. Hist. **17**: 19. 1935; *in* Fungus **26**: 4. 1956; not *Sistotrema* Pers. *ex* Pers., Mycol. europ. **2**: 191. 1825. — *Hydnotrema* Link, Handb. Gewächse **3**: 298. 1833 (name change). — Type species: *Sistotrema confluens* (Pers.) ex Fr.

Sistotrema S. F. Gray, Nat. Arrang. Brit. Pl. **1**: 648. Nov. 1821 ("Persoon"). — Type species: *Sistotrema confluens* (Pers.) ex Fr. (selected).

Sistotrema [sect.] *Eusistotrema* J. Schroet. *in* Cohn, Krypt.-Fl. Schles. **3** (1): 463. 1888. — Type species: *Sistotrema confluens* (Pers.) ex Fr.

Carpophore resupinate or, rarely, pileate and more or less stipitate, thin to membranous, soft, white to cream or yellowish, darkening with age. Context homogeneous. Hymenium smooth, poroid, or covering lamellate teeth. Basidia urniform at some or the final stage of development, 4–8 (mostly 6–)-spored. Spores subcylindrical to subglobose, smooth to minutely asperulate, white in mass. Hyphae usually with clamp connections.

Apart from the two Sistotremas so differently conceived by Persoon and Fries, there exists a third described by S. F. Gray. This author ascribed his *Sistotrema* to Persoon, but since he removed the type-species *S. cinereum* to the genus *Cerrena*, *Sistotrema* S. F. Gray is not identical with *Sistotrema* Persoon. Both genera have one species in common, viz. *S. confluens*, and this is here selected as the type species for Gray's genus.

The result is that, although *Sistotrema* Fr. and *Sistotrema* S. F. Gray are homonymous, they are no homonyms according to the definition of Art. 64, since they are based on the same type.

SISTOTREMA CONFLUENS (Pers.) ex Fr.

Hydnum sublamellosum Bull., Herb. France (legend to) pl. 453 fig. 1. 1789; Hist. Champ. France 306. 1791; *ex* St.-Amans, Fl. agen. 546. Apr. 1821; G. F. Re, Fl. pedemont. Append. 50. 1821. — *Sistotrema sublamellosum* (Bull. ex St.-Amans) Quél. *in* Assoc. franç. Avanc. Sci.**24**: 621 (6 of reprint). 1896. — Type: represented by Bulliard, Herb. France pl. 453 fig. 1. 1789.

Sistotrema confluens Pers. *in* Neues Mag. Bot. **1**: 108. 1794; Syn. meth. Fung. **2**: 551. 1801. — *Sistotrema confluens* (Pers.) *ex* Fr., Syst. mycol. **1**: 426. 1821; Epicr. Syst. mycol. 520. 1838; Hym. europ. 619. 1874. — *Hydnotrema confluens* (Pers. ex Fr.) Link, Handb. Gewächse **3**: 298. 1833. — *Irpex confluens* (Pers. ex Fr.) Kummer, Führ. Pilzk. 49. 1871. — Type: *Sistotrema confluens*. Prope Gottingam lectum (L 910.270–681).

Sistotrema membranaceum Oud. *in* Nederl. kruidk. Arch., ser. 2, **3**: 250. 1879; **6**: 25. 1892; Revis. Champ. Pays-Bas **1**: 406. 1892; not *Sistotrema membranaceum* C. Nees, Syst. Pilze Schw. 227. 1816 ("*Systotrema*") = *Serpula pinastri* (Fr. ex Fr.) W. B. Cooke. — *Sistotrema confluens* f. *membranaceum* (Oud.) P. Karst. *in* Rev. mycol. **3** (No. 9): 19. Jan. 1, 1881; Killerm. *in* Denkschr. bayer. bot. Ges. Regensburg **15**: 48. 1922. — *Sistotrema confluens* subsp. *membranaceum* (Oud.) P. Karst. *in* Medd. Soc. F. Fl. fenn. **6**: 14. 1881. — *Sistotrema confluens* var. *membranaceum* (Oud.) P. Karst. *in* Bidr. Känn. Finl. Nat. Folk **37**: 84. 1882. — Type: *Sistotrema membranaceum* Oud. Ad folia, ramos, muscos; juxta vias prope Baarn; 17 m. Oct. a° 1878; legi *ipse* (GRO).

Irpex anomalus Wettst. *in* S. B. kais. Akad. Wiss. math.-naturwiss. Cl. **94** (1): 62. 1887. — Type: represented by Wettst. *in* S. B. kais. Akad. Wiss. math.-naturwiss. Cl. **94** (1): pl. 1 fig. 1–9. 1887.

DESCRIPTION.—Coker & Beers, Stip. Hydn. east. U.S. 3. 1951.

ILLUSTRATIONS.—(If not mentioned otherwise, all given as *Sistotrema confluens*.) Bail, Syst. Pilze pl. 29 middle row, right hand fig. 1858 (good); Boudier, Icon. mycol. **1**: pl. 169. 1904–1910 (good); Bulliard, Herb. France pl. 453 fig. 1. 1789 (*Hydnum sublamellosum*; very good); Coker *in* J. Mitch. sci. Soc. **41**: pl. 63. 1926; **64**: pl. 22. 1948 (photogr.); Coker & Beers, Stip. Hydn. east. U.S. pl. 1 upper fig. 1951 (photogr.); Fl. batava **26**: pl. 2004. 1924 (passable); Greville, Scot. cryptog. Fl. **5**: pl. 248. 1827 (very good); Konrad & Maublanc, Icon. sel. Fung. **5**: pl. 426

fig. 1. 1935 (fairly good); Patouillard, Tab. anal. Fung., Fasc. 3: fig. 248. 1884 (good); Sowerby, Col. Fig. Engl. Fungi **1**: pl. 112. 1797 (*Hydnum sublamellosum*; very good); von Wettstein *in* S. B. kais. Akad. Wiss. math.-naturwiss. Cl. **94** (1): pl. 1 fig. 1–3. 1887 (*Irpex anomalus*; fairly good).

DIAGNOSTIC CHARACTERS.—Carpophores often confluent, at times resupinate. Pileus depressed to umbilicate, orbicular or, more often, flabelliform, surface finely tomentose, glabrescent, smooth, not zonate, white, becoming yellowish, margin involute, expanding with age, entire or lobed. Stipe central or, more frequently, lateral, slender or very short to nearly absent, tapering downwards, finely tomentose, glabrescent, usually binding vegetable matter, concolorous with pileus. Hymenium at first (always?) irregularly reticulately ridged or poroid, the ridges or dissepiments gradually growing out to decurrent, flattened spines or interrupted plates; whitish to yellowish. Context homogeneous, fleshy-fibrous, shrinking on drying, soft throughout, white. Hyphae with clamp connections.

HABITAT.—Among needles and on humus in coniferous and mixed woods.

DISTRIBUTION.—In central and eastern parts of the country, nowhere common in former days, decidedly rare in recent times.

ILLUSTRATIVE COLLECTION.—Gelderland: Apeldoorn, IX 1894, C. A. J. A. Oudemans (*S. membranaceum*; L).

EXSICCATI.—Klotzsch, Herb. viv. mycol. 1117 (L); Oudemans, Fungi neerl. exs. 235 (*S. membranaceum*; GRO); Rabenhorst, Fungi europ. 310, 310b, 1409 (L); Sydow, Mycoth. germ. 1825 (L).

From the collections examined, the impression may be gained that under circumstances at least parts of the carpophore of *Sistotrema confluens* present themselves as a resupinate fungus. Several of the carpophores on which Oudemans based his *Sistotrema membranaceum* appear to be entirely resupinate. Lundell, on the other hand, states (1947: 11) that *S. muscicola* (Pers.) Lundell, which usually develops resupinately, may in exceptional cases form pileate and stipitate carpophores. I would not know how to distinguish these extreme forms of both species except for the fact that the habitat seems to be different.

The odour of *S. confluens* has been variously appreciated. Greville (1827: 248) described the species as scentless, Coker & Beers (1951: 3) found the odour to be faint, Donk (1931: 148) described the odour as rancid, Bourdot & Galzin (1928: 437) and Konrad & Maublanc (1935) as resinous or of salol (see also Gilbert, 1933: 248), Lundell (1947: 11) as of vanilla. As I have never seen fresh specimens, I can offer no opinion myself.

The attention may be drawn to *Polyporus rutrosus* Rostk. (*in* Sturm, Deutschl. Fl., Abt. 3, Pilze Deutschl. **28**: 43, pl. 22. 1848) which Bresadola (*in* Ann. mycol. **14**: 227. 1916) regarded as identical with the present species. Here again I have no opinion of my own.

Sistotrema confluens f. *thelephoroides* Höhn. (*apud* Strasser *in* Verh. zool.-bot. Ges. Wien **68**: 114. 1918) was shown by Lundell (1947: 52) to be identical with *Cotylidia vitellina* (Plowr.) Lundell.

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INDEX

Auriscalpium S. F. Gray 115
— P. Karst. 115
— *auriscalpium* (L. ex Fr.) Banker . 115
— *vulgare* S. F. Gray 115
— — P. Karst. 115
Bankera carnosa (Banker) Snell, Dick & Taussig 134
Ceratella bresadolae (Quél.) Bigeard & Guill. 131
Clavaria bresadolae Cavara 131
— — Quél. 131
— *caput-medusae* Bull. 123
— *conferta* Paul. 123
— *cornu-cervi* Paul. 126
— *erinaceus* (Bull.) Paul. 123
— *hydnoides* Paul. 129
— *madreporaeformis* Retz. 127
— *multicoma* 123
Cotylidia vitellina (Plowr.) Lundell . 142
Dentinum S. F. Gray 132
— *crocidens* (Cooke) G. H. Cunn. . 133
— *repandum* (L. ex Fr.) S. F. Gray . 134
— *rufescens* (Fr.) Pouz. 134, 135
— — (Schaeff.) ex S. F. Gray. 134, 135
Dryodon P. Karst. 118
— Quél. 118
— *acicularis* (Sacc.) Bourd. 127
— *alpestris* (Pers.) Bourd. 120
— — (Pers.) Pilát 120
— *caput-medusae* (Bull. ex Fr.) Quél.. 123
— *clathroides* (Pall. ex Fr.) P. Karst. 120
— *coralloides* (Scop. ex Fr.) P. Karst. 119
— — f. *caput ursi* (Fr.) Pilát . . . 127
— — "Forme tératologique: *Hydnum caput-ursi* Fr." Bourd. & Galz. . . 127
— — var. *caput-ursi* (Fr.) Quél. . . 127
— — subsp. *Dr. caput-ursi* (Fr.) P. Karst. 127
— — var. *crispus* Cejp 120
— *erinaceus* (Bull. ex Fr.) P. Karst.. 123
— — "Forme: *Hydnum caput-medusae* Bull." Bourd. & Galz. 123
— — var. *caput-medusae* (Bull. ex Fr.) Quél. apud A. Mougeot & Ferry. 123
— *juranus* Quél. 124
Friesites P. Karst. 118
— *caput ursi* (Fr.) P. Karst.. . . . 127
— *coralloides* (Scop. ex Fr.) P. Karst. 119
Hericium Fr. 118
— Pers. ex S. F. Gray 118
— "riad" *Alpestriformia* Nikol. . . . 118
— "riad" *Coralloideformia* Nikol. . . 118
— *abietinum* (Schrad.) ex Schleich.. 127
— — subsp. *stallactiticum* (Schrank) Pers. 126
— *abietis* (Hubert) Nobles 130
— *alpestre* Pers. 120
— — f. *caput-ursi* (Fr.) Nikol. . 120, 127
— — f. *caucasicum* (Sing.) Nikol.. . 131
— *botryoides* S. Ito & Ôtani 126
— *bresadolae* (Quél.) Malençon . . 131
— *caput-medusae* (Bull. ex Fr.) Pers. . 123
— *caput-ursi* (Fr.) Banker 127
— — (Fr.) Corner apud Balfour-Browne 127
— *cardium* Pers. 123
— *caucasicum* Sing. 131
— *clathroides* (Pall.) Pers. 120
— — (Pall. ex Fr.) Pers.. 120
— *commune* Roq.. 123
— *coralloides* (Scop.) Pers. . . . 119, 128
— — (Scop. ex Fr.) S. F. Gray . . 119
— — '*alpestre* sensu Bresadola' form 120
— — contracted form 121
— — normally developed form . . 120
— — f. *caput-ursi* (Fr.) Nikol. . . . 127
— — f. *confluens* Nikol. 127
— *echinus* (Scop. ex Fr.) Pers. . . . 123
— *erinaceus* (Bull. ex Fr.) Pers. . . . 123
— — '*caput-medusae*' form 125
— — normally developed form . . 124
— — f. *caput-medusae* (Bull. ex Fr.) Nikol. 123
— — var. *sulphureum* Thore apud Pers. 124
— — var. *viridescens* Pers.. 124
— *flagellum* (Scop.) ex Pers.. . . . 119
— *grande* Rafin. 124
— *hystrix* (Pers. ex Fr.) Pers. 123
— — var. *H. scoparium* Pers. 123
— *laciniatum* (Leers) ex Banker . . 126
— *mori* Opiz 127
— *muscoides* (Scop.) ex Pers. . . . 132
— *notarisii* (Inz.) Fr. 124
— *nudicaule* Pers. ex Pers. 126
— *ptychogasteroides* Nikol. 132

Hericium ramosum (Bull. ex Mérat) Letellier 126, 132
— — '*caput-ursi*' form 128
— — normally developed form . . 128
— *reichii* Opiz 127
— *stallactiticum* (Schrank) ex Fr. 120, 126
— *strictum* Pers. 123
— *unguiculatum* Pers. 124
Hericius Juss. ex Lam. 118
Heteroporus biennis (Bull. ex Fr.) Laz. 134, 135
Hydnotrema Link 140
— *confluens* (Pers. ex Fr.) Link . . 140
Hydnum S. F. Gray. 132
— L. ex Fr. 132
— sect. *Apus* [subsect.] *Merisma* (Fr.) Killerm. 118
— subgen. *Dryodon* (P. Karst.) Forquignon. 118
— [sect.] *Dryodon* (P. Karst.) J. Schroet.. 118
— [sect.] *Hericium* (Pers.) Pers. . . 118
— sect. *Hericium* (Pers. ex S. F. Gray) L. March. 118
— sect. *Hydnois* Duby 132
— — [subsect.] *Hericium* (Pers. ex S. F. Gray) Duby 118
— — [subsect.] *Mesopus* (Fr.) Duby 132
— sect. *Hydnum* (L. ex Fr.) Beeli . 132
— — (L. ex Fr.) L. March. . . . 132
— trib. *Merisma* Fr. 118
— — [subtrib.] *Genuina* Fr.. . . . 118
— — [subtrib.] *Gomphi* Fr. 118
— sect. *Merisma* (Fr.) Sacc.. . . . 118
— trib. *Mesopus* Fr. 132
— trib. *Mesopus* [sect.] *Carnosa* Fr. 132
— sect. *Mesopus* (Fr.) Sacc. 132
— — subsect. *Carnosa* (Fr.) Sacc. . 132
— — [subsect.] *Carnosa* [ser.] *Tyrodon* (P. Karst.) Killerm. 132
— subgen. *Pleurodon* (P. Karst.) Forquignon. 115
— [sect.] *Pleurodon* (P. Karst.) J. Schroet.. 115
— trib. *Pleuropus* Fr. 118
— [sect.] *Tyrodon* (P. Karst.) J. Schroet.. 132
— *abietinum* (Pers.) Duby . . . 127, 133
— — Schrad. ex Oudem. . . 127, 133
— *abietis* Hubert. 130
— *aciculare* Sacc.. 127
— *agaricinum* G. F. Hoffm. 123
Hydnum album Fr. 135
— — Pers. ex Steud. 135, 138
— *alpestre* (Pers.) Lloyd 120
— *atro-tomentosum* Schwalb. 115
— *aurantium* Rafin. ex Steud. . . . 135
— — (Schwalb) Schwalb. 135
— *auriscalpium* L. ex Fr. 115
— — Lour. 115
— — var. *bicolor* Alb. & Schw. . . 115
— — — Fr. 115
— — var. *rufum* (Cejp) Vel. . . . 116
— *bicolor* Alb. & Schwein. 134
— — Raddi 134, 136
— *bresadolae* Quél. apud Bres.. . . 131
— *brunnescens* Vel. 135, 138
— *bulbosum* Raddi 134, 136
— *caput-medusae* (Bull.) ex Fr. . . . 123
— *caput-ursi* Fr. 127
— — var. *brevispineum* Peck 127
— *carnosum* Batsch 134, 138
— — sensu Gmel. 134
— — (Banker) Trott. apud Sacc. . 134
— *clandestinum* Batsch. 134, 136
— — sensu Gmel. 134
— *clathroides* Pall. ex Fr. 120
— *coralloides* Scop. ex Fr. 119, 128
— — var. *caput-ursi* (Fr.) Cooke & Quél.. 127
— — var. *heteromorpha* Alb. & Schw. 127
— — var.?*Hydnum abietinum*(Schrad.) Pers. 127
— — var.? *Hydnum clathroides* (Pall.) Pers. 120
— — var.? *Hydnum stallactiticum* (Schrank) Pers. 126
— — var. *subterraneum* Harz . . . 127
— — — Kickx 127
— *coralloideum* Batsch 119, 126
— *crispum* Schaeff. 119
— — Scop. 119
— *diffractum* Berk. 135, 136
— *echinus* (Scop.) ex Fr. 123
— *erinaceus* Bull. ex Fr.. 123
— — Retz. 123, 126
— — var. *caput-medusae* (Bull. ex Fr.) Cost. & Dufour 123
— *fechtneri* Vel. 116
— *flagellum* (Scop. ex Pers.) Streinz 119
— *flavidum* Lloyd 134
— — Schaeff.. . . . . 134, 136
— *grande* (Rafin.) ex Steud.. . . . 124
— *heimii* Maas G. 133

Hydnum hystricinum Batsch 123
— *hystrix* (Pers.) ex Fr. 123
— *imbricatum* L. 136
— — sensu Bolt. 136
— *juranum* (Quél.) P. A. Sacc. & D. Sacc. 124
— *laciniatum* Leers 126
— *luteolum* Fr. 117
— *medium* Pers. 134, 136
— *muscoides* Lloyd 127, 132
— — Schum. 127, 132
— *notarisii* Inzenga. 124
— *novae-zealandiae* Colenso. 127
— *omasum* Panizzi 124
— *pallidum* Cooke & Ellis. 135
— — Raddi 135, 138
— *persoonii* Poiret 134
— *quercinum* (Pers.) ex Fr. 123
— *ramaria* Fr. 126
— *ramosissimum* L. March. & R. Court. 126
— *ramosum* Bull. ex Mérat . . 126, 127
— — Schw. 126, 127
— *repandum* L. ex Fr. 134, 136
— — sensu Bolt. 138
— — var. *albidum* Cejp . . . 135, 138
— — — (Peck) Bres. 138
— — var. *album* Kawamura . 135, 138
— — — (Quél.) Rea 135, 138
— — var. *aurantium* Schwalb . 135, 136
— — var. *clandestinum* (Batsch) ex Kickx 134
— — var. *denudatum* Fr. . . . 135, 136
— — — [f.] *albidum* Fr. 134
— — — [f.] *flavidum* (Schaeff.) Fr. 134
— — — [f.] *rufidum* Fr. 134
— — var. *flavidum* (Schaeff.) ex Harzer 134
— — var. *intermedium* Fr. . . . 135, 136
— — var. *repandum* 136
— — var. *rufescens* (Fr.) Barla 135, 138
— — — (Fr.) Peck 135
— — subsp. *H. rufescens* (Fr.) Fr. . 135
— — var. *serotinum* (Quél. apud Bourd.) Bourd & Galz. 135
— — var. *squamosum* (Schaeff.) Fr. 134
— *roseum* Raddi 135, 136
— — Saut. apud Schiederm. . . . 135
— *rufescens* Fr. 134, 135, 138
— — (Pers.) Poiret 134, 135
— — Schaeff. 134, 135, 136
— — Schaeff. sensu Pers. 135
Hydnum rufescens var. *avellanae* Vel. 135, 136
— — var. (*undulato-*) *repandum* Kickx 135, 136
'— *sinuatum* Bull.' 140
— *squamosum* Bull. ex G. F. Re . . 134
— — Schaeff. ex Fr. 134, 136
— *stallactiticum* Schrank 126
— *strictum* (Pers.) ex Steud. 123
— *sublamellosum* Bull. ex St.-Amans. 141
— *unguiculatum* (Pers.) Streinz . . . 124
Hypothele Paul. ex Banker 132
— *repanda* (L.) Paul. 134
— — (L. ex Fr.) Banker 134
Irpex anomalus Wettst. 141
— *confluens* (Pers. ex Fr.) Kummer . 141
Leptodon auriscalpium (L. ex Fr.) Quél. 115
— *luteolus* (Fr.) Quél. 117
Manina Adans. 118
— Banker. 118
— *caput-ursi* (Fr.) Banker 127
— *coralloides* (Scop. ex Fr.) Banker. 119
— *cordiformis* Scop. ex Banker . . . 123
— *flagellum* Scop. 119
— — (Scop. ex Pers.) Banker . . . 119
— *muscoides* Scop. 127, 132
— *ramosissima* Scop. 126
Martela Adans. 118
Martella Adans. ex O.K. 118
— Endl. 118
— *alpestris* (Pers.) Lloyd 120
— — (Pers.) O.K. 120
— *echinus* (Scop. ex Fr.) O.K. . . 123
— *hystricinum* (Batsch) ex O.K. . . 123
— *hystrix* (Pers. ex Fr.) Lloyd . . . 123
— *notarisii* (Inz.) Lloyd. 124
— — (Inz.) O.K. 124
Medusina Chev. 118
— *coralloides* (Scop. ex Fr.) Chev. 119, 128
— *patula* Chev. 123
Merisma caput-medusae (Bull. ex Fr.) Spreng. 123
— *clathroides* (Pall. ex Fr.) Spreng.. 120
— *coralloides* (Scop. ex Fr.) Spreng.. 119
— *hystrix* (Pers. ex Fr.) Spreng.. . 123
Mycoleptodon luteolus (Fr.) Bourd. . . 117
Phaeodon squamosus (Schaeff. ex Fr.) P. Henn. 134
Pleurodon P. Karst. 115
— *auriscalpium* (L. ex Fr.) P. Karst. 115
— — var. *rufus* Cejp 116
— *fechtneri* (Vel.) Cejp 116
— *luteolus* (Fr.) Bourd. & Galz. . . 117

Polyporus rutrosus Rostk. 142
Pseudohydnum gelatinosum (Scop. ex Fr.) P. Karst. 134
Sarcodon P. Karst. 132
— *abietinus* Heim 133
— *imbricatus* 136
— *repandus* (L. ex Fr.) Quél. . . . 134
— — var. *albus* Quél. 135, 138
— — var. *rufescens* (Fr.) Quél. . . 135
— — var. *serotinus* Quél. apud Bourd. 135, 138
— *rufescens* (Fr.) Heim 135
— *squamosus* (Schaeff. ex Fr.) P. Karst. 134
Scutiger auriscalpium (L.) Paul. . . . 115
Serpula pinastri (Fr. ex Fr.) W. B. Cooke 141
Sistotrema Fr. em. Donk. 140
— S. F. Gray 140
— Pers. ex Pers.. 140
— [sect.] *Eusistotrema* J. Schroet. . 140
— *cavinae* Vel.. . . . . 135, 136
— *confluens* (Pers.) ex Fr. 141
— — f. *membranaceum* (Oud.) P. Karst. 141
— — — (Oud.) Killerm. 141
— — var. *membranaceum* (Oud.) P. Karst. 141
— — subsp. *membranaceum* (Oud.) P. Karst. 141
— — f. *thelephoroides* Höhn. apud Strasser 142
— *membranaceum* C. Nees. 141
— — Oud. 141
— *muscicola* (Pers.) Lundell 142
— *sublamellosum* (Bull. ex St.-Amans) Quél.. 141
Steccherinum quercinum S. F. Gray . . 123
Tyrodon P. Karst. 132
— *repandus* (L. ex Fr.) P. Karst. . . 134
— — subsp. *T. rufescens* (Fr.) P. Karst. 135
— *rufescens* (Fr.) P. Karst.. 135

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OBSERVATIONS ON GASTEROMYCETES—VIII

Persoon's specimens of Geastrum pectinatum Pers. and a reassessment of Geastrum plicatum Berk. and G. tenuipes Berk.

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(With 26 Text-figures)

The authentic collections of *Geastrum pectinatum* Pers., *G. plicatum* Berk. and *G. tenuipes* Berk. are redescribed. Persoon's collection in the Rijksherbarium, Leiden, is designated as the Neotype of *G. pectinatum*. *Geastrum plicatum* and *G. tenuipes* are considered as probable synonyms, although observations on freshly expanded specimens are still required. Comparisons are made between freshly collected and dried material in the British Museum (Nat. Hist.), the Hartley Botanical Laboratories, the Rijksherbarium and Herb. Kew, and the literature is discussed.

Introduction.—The main purpose of this paper is to designate the Neotype of *Geastrum pectinatum* Pers. but the opportunity has also been taken to re-examine Berkeley's type specimens of *G. plicatum* and *G. tenuipes*, generally regarded as synonyms of *G. pectinatum*. Dried collections in the herbaria of the British Museum (Nat. Hist.), London; the Hartley Botanical Laboratories, Liverpool; the Rijksherbarium, Leiden; and the Royal Botanic Gardens, Kew, have been investigated and are compared with the types and freshly developed material studied by the author.

The fungi preserved in Persoon's Herbarium at Leiden were most probably acquired during the latter part of Persoon's life, whilst he was living in Paris, and it is doubtful, therefore, whether they can be considered to be the types of the species described in his 'Synopsis methodica fungorum' (1801), which was published whilst Persoon was living in Germany. However, the specimens indicate what Persoon had in mind and, in the absence of earlier authentic specimens, the author considers that neotypes should be selected from them in accordance with the International Code of Botanical Nomenclature.

In Persoon's Herbarium, the determination of some specimens is followed by a question mark whilst others, although often similar macroscopically, are found to have more than one species on the same sheet when examined microscopically, whilst some names were never published. With his classification being necessarily based on gross morphology, especially as microscopy was still in its infancy, we should not be too critical of Persoon, who could hardly be expected to anticipate

our decision to use his work (1801) as the starting point for the nomenclature of the Gasteromycetes just over one century later. Fortunately, no problem exists with *Geastrum pectinatum* as there is only a single sheet bearing this name and the two specimens glued to it are typical of the fungus which modern workers call *G. pectinatum* Pers.

Today, most European workers are agreed upon the limits of *Geastrum pectinatum* and can readily distinguish it from the related species with non-hygroscopic exoperidia, smooth endoperidia and sulcate mouths, i.e. *Geastrum badium* Pers., *G. bryantii* Berk. (= *G. striatum* DC.) and *G. nanum* Pers. Outside Europe, however, the situation is different and, particularly in Australasia, workers have experienced difficulty in separating *G. pectinatum* from its relatives. With the leathery peridia preserving so well, little critical observation seems to have been made on freshly expanded specimens and it is on such structures as the *Fleshy Layer*, which more readily succumb to attacks by insects and micro-organisms, that further information is required.

The author's examination of the type material of *G. plicatum* Berk. and *G. tenuipes* Berk. shows that, whilst both specimens deviate in some respects from the typical European form of *G. pectinatum*, the differences do not appear to warrant their separation as distinct species when taking into account the climatic conditions. However, the *Fleshy Layer* with the characteristic columnar structure around the *Pedicel* which, after its shrinkage to a ring-like appendage lying at the base, has often caused *G. pectinatum* to be confused with *G. bryantii* in Europe, is missing from the type specimens. Also, no record of this structure and little mention of the *Fleshy Layer* is found in the literature or herbarium specimens.

TECHNIQUE.—As in earlier papers in this series, microcharacters have been examined in Erythrosin Ammonia (Palmer 1955) and microscopic characters are camera-lucida drawn. The formulae show minimum, average and maximum measurements.

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GEASTRUM PECTINATUM PERS.

The single sheet bearing this name in Persoon's Herbarium in the Rijksherbarium, Leiden, is numbered H. L. B. 910.262–391 and bears two rather weathered specimens which, being similar in general appearance, probably belong to the same collection.

Overall dimensions: 7.5 × 8.5 cm. *Exoperidium* with 7 and 8 subdivided, broadly acuminate to narrowly wedge-shaped rays, divided about half-way to the centre and arched at the base. *Mycelial Layer* brown, lightly debris encrusted. Separated in one specimen from the rays. *Fibrillose Layer* varying from a thin, papery structure to a more tough consistency and yellow-ochraceous in colour. *Fleshy Layer* absent. *Endoperidium* 2 × 2.5 cm, smooth, globose, dark-brown to purplish, stipitate, lighter below with an inconspicuous, upwards tapering *Apophysis* varying from smooth to very faintly striate. *Pedicel* 5 × 3.5 mm, equal, circular or flattened in section. *Mouth* 6 mm tall, sulcate, conical, brown and merging with the surrounding *Endoperidium*. *Gleba* dark brown. *Capillitium* brown, thick-walled with the lumen indistinct, simple, sometimes very thin and sinuous, occasionally with abrupt bends and encrusted, between 4.4 μ and 13.3 μ maximum diameters, tapering to 1.2 to 3 μ at the tips. *Spores* brown, globose to subglobose, 1-guttulate, thick-walled, 4.2–4.5–5.1 × 4.1–4.5–4.8 μ, with flat-topped digitate verrucae, 5.8–6.1–7.0 × 5.5–5.9–6.4 μ.

This collection is herewith formally designated as the Neotype.

GEASTRUM PECTINATUM IN BRITAIN

In Britain, the species is sparsely recorded and appears to be of local occurrence although tending to recur annually in established habitats. In the national herbaria, British material appears to be represented by only three collections at the British Museum (Nat. Hist.) and three at the Royal Botanic Gardens, Kew, whilst there are eight collections in the Mycological Herbarium of the Hartley Botanical Laboratories, two of which are also represented in the Kew Herbarium.

Most collections have been made under conifers (*Pinus*, *Picea*, *Taxus*, *Cupressus* and *Chamaecyparis*) whilst those without data usually have coniferous needles adhering to the *Mycelial Layer*. The species is not confined to conifers as the author has seen material from other habitats, i.e. in a hollow *Fraxinus* and from beneath *Crataegus*.

The following description is based on fresh and preserved British material examined by the author.

UNEXPANDED PERIDIA.—No specimens with immature glebae have been seen by the author and, as no account of the basidia appears to have been published, these structures are yet to be described. The eggs, approximately 1.5 × 2.5 × 2.5 cm, although recorded about 5 cm broad by Staněk (1958), are depressed-globose structures, externally densely covered with debris and, being embedded in the substratum, are difficult to locate. Expansion is similar to that for other species and, on completion, the rays are typically recurved with the base arched and the fungus standing on the surface of the *Fleshy Layer*.

FRESHLY-EXPANDED PERIDIA.—On completion of expansion, peridia measure from 2.5 to 9.5 cm of the expanded rays. *Exoperidium* non-hygroscopic, fissuring into 5–10 broadly acuminate to narrow, wedge-shaped rays, often subdividing at the tips. The base is usually arched. *Mycelial Layer* densely coated with the substratum, usually coniferous needles, cream in colour and very persistent. *Fibrillose Layer* tough and leathery, whitish where exposed. *Fleshy Layer* whitish at first, becoming creamy-brown, often rimose, from 3 to 4.5 mm thick, continuous over the ray surface but frequently cracking or fissuring, although rarely flaking away, and forming a thick columnar structure which completely encloses the *Pedicel* and

flares out above where it is in close contact with the lower part of the *Endoperidium*, not infrequently corrugated where it has been in contact with the furrowed base of the *Endoperidium*. A slightly pungent or soapy odour and a somewhat bitter taste have been detected. *Endoperidium* 5–25 × 7–25 mm, depressed-globose to obturbinate, usually somewhat hemispherical in profile with the basal part lobed, smooth, purplish-brown to greyish-purple or very occasionally creamy-ochraceous, smooth to finely pubescent, often coated with whitish granules or a grey to buff farinaceous deposit. The base is obscured by the columnar structure of the *Fleshy Layer* but, on exposure, the upwards tapering *Apophysis* is found to vary from smooth through varying degrees of striae to plicate with such corrugations being partly decurrent down the upper part of the *Pedicel*. *Mouth* to 6 mm tall, conical, brown, sulcate, merging into the surrounding *Endoperidium*, rarely in a depressed area, typically acute but occasionally tubular and varying from typically conical to almost plain. *Gleba* dark-brown. *Columella* fusiform to broadly ellipsoid, about two-thirds of the endoperidial height.

DRIED OR WEATHERED EXPANDED PERIDIA.—Individuals which have dried under optimum conditions, either in the field or after collection, usually have the *Fleshy Layer* adhering to the rays as dried-up brown remnants with the columnar structure collapsed round the base of the *Pedicel* as a ring or collar.

Weathered specimens, often collected during the following Spring, have usually lost all traces of their *Fleshy Layer* and the persistent *Mycelial Layer* may also have disappeared. The exposed *Fibrillose Layer* varies from ochraceous to buff on the upper part, which is often green with algae, and the under part, after the *Mycelial Layer* has separated, is of a similar colour but, occasionally, silvery white. The *Pedicel* is now clearly apparent, 3–10 × 1.8–6 mm, varying in section from circular to elliptical, usually somewhat narrower at the middle but broadening out gradually above to form a thick base to the *Endoperidium* which becomes a somewhat inconspicuous, usually upwards tapering *Apophysis* when the *Endoperidium* shrinks. During damp conditions, or if the fungus is soaked, the *Endoperidium* resumes its original shape and size and the *Apophysis* virtually disappears.

MICROSCOPICAL CHARACTERS.—*Capillitium* brown, simple, rarely with narrow, usually short, side branches, nodular to rough, occasionally sinuous and sometimes with abrupt bends, thick-walled, with a prominent to an indistinct lumen, 1130–2570 μ long, with maximum diameters of the threads 6–17.5 μ, tapering to blunt ends ca. 2 μ thick. *Spores* brown, globose, typically with long, flat-topped warts, occasionally with a central guttule, but varying to rough or smooth, 3.6–4.7–6.2 × 3.6–4.6–5.5 μ, with the flat-topped, digitate verrucae 4.5–6.9–8.4 × 4.6–6.7–8.4 μ.

COLLECTIONS IN HERBARIA

Variations are to be found in all collections and only the most noteworthy are discussed.

BRITISH MUSEUM (NAT. HIST.), LONDON.—

(1) Without locality. November 1875. Det. as *Geaster striatus* DC. Leg. *Rev. G. H. Sawyer* (Herb. C. E. Broome). *Apophyses* with deeply decurrent sulcations. *Spores* with digitate verrucae 5.9–6.8–7.6 × 5.2–6.5–7.4 μ. Thick needle litter adhering to *Mycelial Layer*.

(2) Banner Down, Batheaston, Somerset, April 1869. Det. as *Geaster striatus* DC. Leg. *Mr. Williams* (Herb. C. E. Broome). *Mycelial Layer* absent. *Apophysis* with striations. *Spores* coarsely verrucose, 6.3–6.7–7.6 × 5.2–6.2–6.8 μ.

(3) Dropmore, Berks., October 1867. Det. as *G. striatus* (Herb. C. E. Broome). *Mycelial Layer* with clayey soil and needles. *Endoperidium* prominently sulcate. *Spores* with digitate verrucae, 5.8–6.8–7.8 × 5.8–6.6–7.7 μ.

THE HARTLEY BOTANICAL LABORATORIES, LIVERPOOL.—

LIVU 1000: Holkham Gap, Norfolk. 6 October 1958. In sand amongst short grass under *Pinus nigra*. Leg. *J. T. Palmer*. *Mycelial Layer* mainly coated with sand and debris but appearing light brown and split to show *Fibrillose Layer* where the adhering substrate is denuded. *Endoperidia* mainly purplish-brown but buff in one specimen. *Apophyses* slightly to moderately swollen, always upwards tapering, and varying from smooth to sulcate. *Spores* with digitate verrucae, 6.4–7.7–8.4 × 6.5–7.6–8.4 μ.

LIVU 1112: Coed Pwll-y-blawd, Denbighshire, Wales. 8 May 1952. Leg. *A. E. Willett*. On grassy bank beneath *Picea excelsa*, on limestone. *Mycelial Layer* with needle debris. *Endoperidium* with upwardly tapering *Apophyses* with striations. *Spores* with digitate verrucae, 5.6–6.6–7.6 × 5.6–6.3–7.0 μ. Recorded by Palmer (1952).

LIVU 1114: As for above. 21 October and 1 November 1953. Leg. *J. T. Palmer*. *Apophyses* inconspicuous and varying from striate to sulcate. *Spores* with digitate verrucae, 6.3–7.4–8.2 × 6.3–7.0–7.6 μ.

LIVU 1129: Under *Taxus* and *Fagus* on chalk downs, Mickleham, Surrey. 1 June 1953. Leg. *R. W. G. Dennis*. Weathered previous year's specimen with abundant needle debris clinging to the *Mycelial Layer*. *Endoperidium* shrunken into a rim-like *Apophysis* with plications beneath. *Spores* with digitate verrucae, 6.2–7.3–7.9 × 5.7–6.9–7.8 μ.

LIVU 1158: Under *Pinus* sp., Holkham Meols, Norfolk. 3 November 1954. Leg. *T. J. Wallace*. *Mycelial Layer* densely coated with sand and needle debris. *Apophysis* with faint striations but *Endoperidium* tending to collapse and to form a rim-like structure around the *Apophysis*. *Spores* with digitate verrucae, 5.6–6.3–7.2 × 5.5–6.3–7.2 μ.

LIVU 1197: Under *Cupressus macrocarpa* in very large numbers, Friston Forest near Seaford, Sussex. 17 November 1956. Leg. *P. K. C. Austwick* and *P. D. Orton*. Very variable in size. *Apophyses* varying from inconspicuous to prominent with the surface from smooth to plicate, often with the *Endoperidium* tending to collapse around it and form a rim-like structure. *Spores* with digitate verrucae, often forming a halo, 5.9–7.0–7.7 × 5.9–6.8–7.4 μ.

LIVU 1200: Amongst litter under *Chamaecyparis lawsoniana glauca*, Royal Horticultural Society's Gardens, Wisley, Ripley, Surrey. 20 November to 4 December 1956. Leg. *W. Sykes* and *R. P. Scase*. *Apophyses* inconspicuous to prominent and smooth to striate. *Spores* with digitate verrucae, 4.5–6.7–7.6 × 4.6–6.4–7.5 μ.

LIVU 1223: Under *Picea excelsa*, on limestone, Fetcham Downs, Surrey. November 1956. Leg. *Winifred M. Parker*. *Apophyses* prominent, striate. *Spores* with digitate verrucae, 5.6–6.6–7.0 × 5.6–6.4–7.0 μ.

THE HERBARIUM, THE ROYAL BOTANIC GARDENS, KEW.—

(1) In a hollow *Fraxinus excelsior*, Hereford. 6 October 1954. Leg. *M. Porter*. *Mycelial Layer* encrusted with humus. *Apophysis* slight and indistinctly striate. *Spores* with digitate verrucae, 4.9–6.9–7.9 × 4.9–6.6–7.7 μ.

CONTINENTAL AND EXTRA-EUROPEAN COLLECTIONS

THE HARTLEY BOTANICAL LABORATORIES, LIVERPOOL.—

LIVU 1206: On coniferous needles, Strausberg near Berlin, Germany, 1952. Leg. *H. H. Handke*. *Apophyses* inconspicuous, striate. *Spores* with digitate verrucae, 6.2–6.8–7.7 × 6.0–6.6–7.4 μ.

LIVU 1207: On coniferous needles, between Blankenheim and Unterharz, Germany. September 1952. Leg. *H. H. Handke*. *Apophysis* striate. *Spores* with digitate verrucae, 5.9–6.5–7.0 × 5.6–6.2–6.8 μ.

THE RIJKSHERBARIUM, LEIDEN.

L 939.334–8: Under *Pseudotsuga douglasii*, Bergen op Zoom, prov. Noord-Brabant. Leg. *J. Schreinemakers*. November 1923. *Apophysis* with faint striae. *Spores* with digitate verrucae, 6.0–6.6–7.9 × 5.7–6.3–7.7 μ.

L 939.334–15: Bergen op Zoom, prov. Noord-Brabant. Leg. *J. Schreinemakers*. 26 August 1924. *Apophyses* smooth to faintly striate or sulcate in one specimen. *Spores* with digitate verrucae, 6.5–7.2–7.8 × 6.4–7.0–7.8 μ.

L 939.334–16: Under *Picea*, Wapenvelde, prov. Gelderland. Leg. *W. van der Meulen*. October 1924. *Apophyses* with prominent basal striations. *Spores* with prominent verrucae, 5.1–6.2–7.3 × 5.1–6.1–6.7 μ.

L 949.204–137: Wapenvelde, prov. Gelderland. Leg. *W. van der Meulen*. October 1924. *Apophyses* striate to faintly sulcate. *Spores* with digitate verrucae, 5.5–6.6–7.8 × 5.0–6.3–7.1 μ.

L 939.334–17: Wapenvelde, prov. Gelderland. Leg. *W. van der Meulen*. *Apophyses* with basal striations. *Spores* with digitate verrucae, 4.7–6.8–7.9 × 4.7–6.5–7.7 μ.

L 939.334–18: In *Picea* wood, Wapenvelde, prov. Gelderland. 31 August 1920. Leg. *W. van der Meulen*. *Apophyses* striate to sulcate. *Spores* with a halo of digitate verrucae, 6.3–6.9–7.4 × 6.2–6.7–7.3 μ.

L 949.204–129: Wapenvelde, prov. Gelderland. October 1922. Leg. *W. van der Meulen*. *Apophysis* with basal sulcations. *Spores* with well spaced digitate verrucae, 5.4–7.4–8.5 × 5.4–7.2–8.1 μ.

L 939.334–19: Coniferous wood on the dunes, Oranjekom, Vogelenzang, prov. Noord-Holland. Leg. *Duyvestein* and *Klein*. December 1912. *Apophyses* varying from smooth to faintly striate. *Spores* with digitate verrucae, 5.4–7.0–8.1 × 5.4–6.9–7.8 μ.

L 939.334–20: Without data. Leg. *C. Cool*. *Apophyses* with strong striations. *Spores* with digitate verrucae, 6.2–6.8–7.8 × 6.2–6.5–7.6 μ.

L 939.334–21: "Naaldenveld", Aerdenhout, prov. Noord-Holland. Leg. *E. Kits van Waveren*. 28 April 1924. *Mycelial Layer* coated with sand and humus. *Apophysis* striate. *Spores* with digitate verrucae, 5.0–6.4–7.5 × 5.1–6.4–7.5 μ.

L 952.119–569: On the dunes northerly of Beverwijk, prov. Noord-Holland. 1951. Leg. *H. J. van der Laan*. *Mycelial Layer* debris encrusted. *Apophysis* prominently striate. *Spores* with digitate verrucae, 5.9–6.6–7.8 × 5.9–6.4–7.4 μ.

L 955.052–182: Previous year's specimen amongst moss on sand under *Pinus* sp. in the dunes, Vogelenzang, prov. Noord-Holland. Leg. *R. A. Maas Geesteranus*. 11 April 1955. *Mycelial Layer* missing. *Apophysis* with prominent striations. *Spores* with digitate verrucae, 5.4–6.6–7.8 × 5.1–6.1–7.0 μ.

L 955.118–113: Dunes, Oosterbeek, prov. Gelderland. Leg. *B. K. Boom*. 15 October 1924. *Mycelial Layer* debris and needle encrusted. *Apophyses* almost smooth to faintly striate. *Spores* with digitate verrucae, 5.9–7.1–8.2 × 5.9–6.8–7.7 μ.

THE HERBARIUM, THE ROYAL BOTANIC GARDENS, KEW.—

Only two of the extra-European collections examined are dealt with here as they are typical of the European form of *Geastrum pectinatum*. The other collections can be found under *Geastrum plicatum* Berk. and *G. tenuipes* Berk.

(1) Union Department of Agriculture, Mycological Herbarium No. 1337. Under trees, Garstfontein, Pretoria Dist., South Africa. Leg. *E. M. Doidge*. 11 March 1911. Det. as *G. tenuipes*. *Mycelial Layer* whitish and heavily encrusted with deciduous leaf-mould. *Fleshy Layer*

creamy-brown (originally probably cream), thick, not fissuring, with remnants of a columnar structure around the *Pedicel*. *Apophysis* tapering upwards with deep plications partly filled by the fawn farinose deposit. *Spores* with very coarse, nodular verrucae, 6.8–7.5–8.5 × 6.5–7.1–8.2 μ. This was cited under *G. pectinatum* by Bottomley (1948).

(2) Phytologic Museum of Melbourne. Baron Ferd. von Mueller. Upper Hunter River, N.S. Wales, Australia. Leg. *Miss Carter*. *Mycelial Layer* thickly bound with soil. *Fleshy Layer* of dried-up, dark-brown remnants. *Apophysis* tapering upwards with prominent sulcations. *Spores* with digitate verrucae, 4.6–6.5–7.9 × 4.6–6.3–7.6 μ.

GEASTRUM PECTINATUM IN LITERATURE

The diagnosis of Persoon (1801) reads:—

"Peridio pedicellato umbrino: ore acuto conico, radiis multifidis fornicatis pallidis .... *Laciniae* s. radii, laxae, in- aut extrorsum reflexae. *Pedicelli* saepe sulcati. *Peridium* utrinque subattenuatum, punctatum, plicatum. Oris fimbriae longiores et crassiores quam in praecedente. Colore umbrinum."

He cited the excellent figures of Schmidel (1776), i.e. Tab. 145 (*Lycoperdon volvam reflectens cre pectinato*), Figs. 11–14, and *Geastrum multifidum* var. *a* of his earlier work (1797). Later, Persoon (1809) wrote: "C'est une des plus grandes espèces, les rayons sont entièrement réfléchis, blanchâtres et minces. Le péridie est un peu brunâtre." His illustration (Pl. II, Fig. 4), shows the *Exoperidium* divided into eight expanded rays tending to curl inwards, with an arched base, a tall, stout, ± equal *Pedicel*, a globose *Endoperidium* and a sulcate *Mouth*. There are no indications of either striae, sulcations or an *Apophysis* at the base of the *Endoperidium* and the *Fleshy Layer* is missing.

Tab. XXXVII of Schmidel (1776) portrays both *Geastrum pectinatum* and *G. quadrifidum* Pers. as *Lycoperdon volvam reflectens ore pectinato*. Figs. 14 and 15 show very typical desiccated specimens of *G. pectinatum* with remnants of the *Fleshy Layer* persisting on the rays and the collapsed collar-like columnar structure round the *Pedicel*. The *Mouths* are sulcate and conical. Figs. 13 and 14 are less certain for *G. pectinatum* as they show a more flattened sulcate *Mouth*, upwards of ten rays and rather swollen, smooth *Apophyses*. Hollós (1904) referred them to *Geastrum limbatum* Fr. (= *G. coronatum* Pers.), although this species is admirably represented in Schmidel's plate, Tab. XLVI, Figs. 1–6, as *Lycoperdon volvam explanans*.

Desvaux (1809) recombined the specific epithet as *Plecostoma pectinatum* but this name does not seem to have been taken up elsewhere.

Fries (1829) confused the issue by placing Persoon's species under both *Geastrum fornicatum* and *G. striatum*, whilst Schmidel's Tab. XXXVII is referred to *G. fornicatum*.

Tab. 5, fig. 3 of Fuckel (1870) for *Geastrum calyculatum* Fckl. n. sp. shows what appears to be the endoperidial basal collar of *G. bryantii* with the collapsed columnar structure of *G. pectinatum* at the base of the *Pedicel*. Fuckel stated 'peridio supra annulo constricto, longitudinaliter plicato' but this seems to refer to the constrictions shown on the side of the *Endoperidium* in his figure and not to the characteristic structure on the *Apophysis* in *G. pectinatum*.

In Britain, Smith (1873) illustrated *G. pectinatum* by his Fig. 95 as *G. limbatum* Fr. His figure shows a geaster with a long *Pedicel* and a tall, conical *Mouth* which,

being republished in Plowright (1873) and Ramsbottom (1923), has tended to confuse British mycologists to the present day. The species described and figured by Massee (1889) under *G. schmideli* is undoubtedly also *G. pectinatum*.

Scherffel (1896) described the species as new as *Geaster Bryantii* Berk. forma *fallax* on the grounds of the basal ring which, of course, is the dried-up remains of the columnar structure and remarking on the 'often beautiful radially grooved *Apophysis*'.

Hollós (1902) appears to have re-established the name *Geastrum pectinatum* Pers., subsequently taken up by Lloyd (1902), and the species has since appeared under this name in most European monographs.

Outside Europe, Cunningham (1926 & 1944) experienced difficulty in determining Australian specimens, and this problem is dealt with separately under *Geastrum plicatum*.

Taxonomic criteria

Geastrum pectinatum belongs to the group of geasters with a non-hygroscopic *Exoperidium*, a smooth *Endoperidium* and a sulcate *Mouth*.

The taxonomic characters are (a) the depressed-globose form of the egg, which develops immersed in the substratum, (b) the arched form of the fully expanded *Exoperidium*, usually with the rays revolute, (c) the whitish colour of the *Fleshy Layer* (only apparent in freshly expanded specimens); (d) the characteristic columnar structure which completely surrounds the *Pedicel* and obscures the wrinkles or furrows of the base of the *Endoperidium* on expansion but later shrivels or completely disappears to reveal (e) the tall *Pedicel* and (f) the upwards tapering, somewhat inconspicuous *Apophysis* with (g) a surface varying from smooth through varying grades of striae to plicate, (h) the smooth *Endoperidium*, (i) the tall, conical to tubular, sulcate *Mouth*, rarely seated in a depressed area, (j) the thick *Capillitium* with maximum diameters varying from 6 μ to 17.5 μ, but usually rarely exceeding 10 μ, and (k) the typically digitate verrucae of the *Spores*, from 4.6 μ to 8.5 μ including the warts, with the verrucae often in the form of a halo.

The *Peridium* develops hypogeously as a depressed-globose structure, hence the *Mycelial Layer* is densely coated with the substratum, and, on expansion, the base becomes arched with the rays typically revolute, although sometimes expanded to involute. Dried specimens in the latter condition have usually been collected before expansion has been completed or have been prevented from expanding fully by being deeply immersed in the substratum.

The *Fleshy Layer* has received little attention, mainly because, as with other species of *Geastrum*, specimens are so often collected in an old, weathered condition when this layer has completely disappeared. The columnar structure formed round the *Pedicel* is unrecorded in British literature but is shown in great detail by Eberle (1951a–b and 1956). Published photographs showing this layer, often with allusions in the text, are given by Lloyd (1902), Bottomley (1948) and Staněk (1958). *Geastrum nanum* Pers., which has a short *Pedicel* and a prominent *Apophysis*, has a *Fleshy Layer* plane with the base of the *Endoperidium* when freshly expanded. *Geastrum bryantii*, on the other hand, has a short columnar structure which fills the interior of the collar at the base of the *Endoperidium* and is well illustrated in the figures of Eberle

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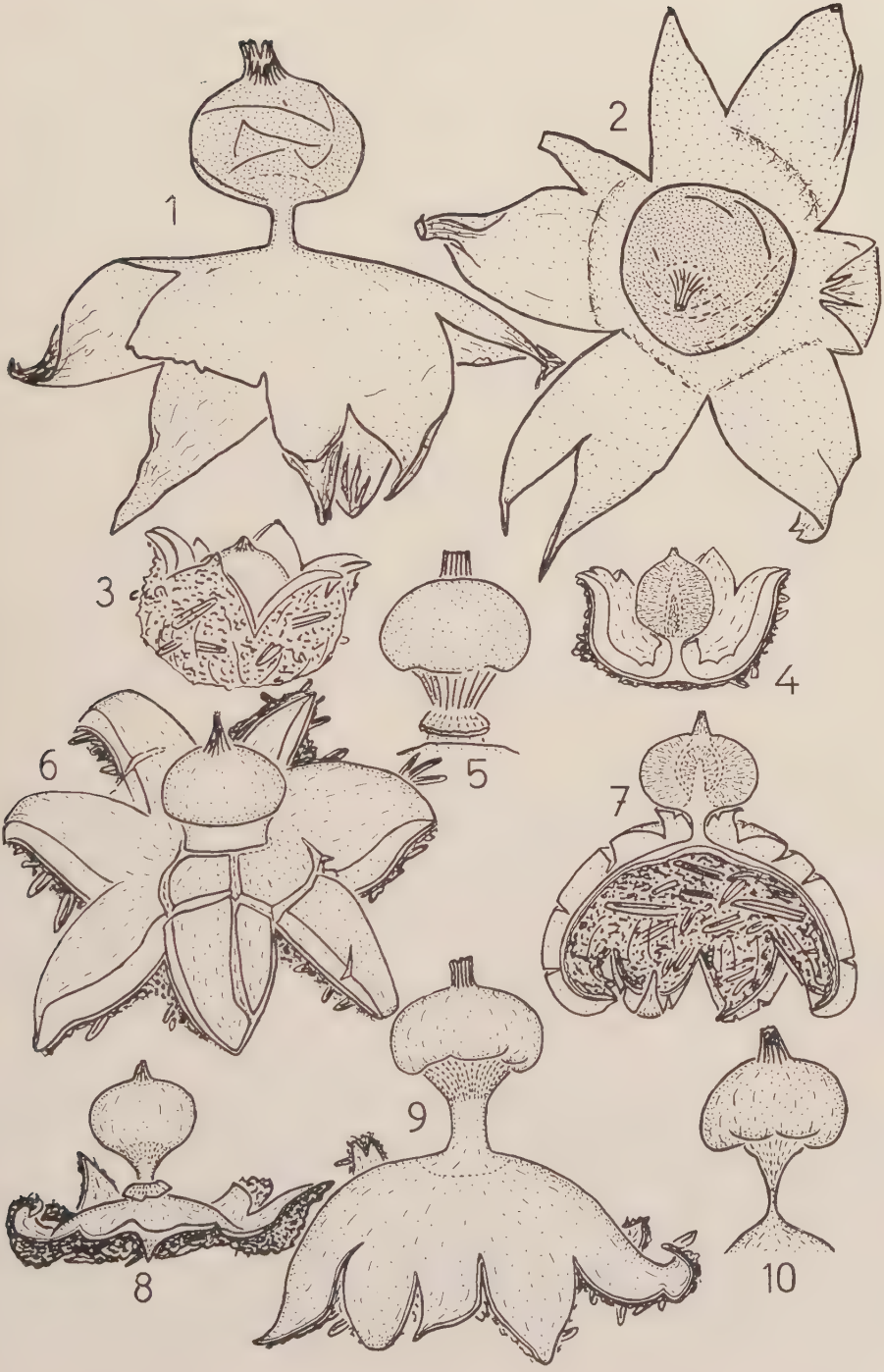
Figs. 1–10. *Geastrum pectinatum* Pers.—Macroscopic 1 ×.

Figs. 1–2. Neotype in L: Persoon's specimens.

Figs. 3–10. British *G. pectinatum* from LIVU 1114 except 5, which is from LIVU 1197: 3—expanding egg and 4—section; 5—dried specimen showing collapsed columnar structure and grooved *Apophysis*; 6—freshly expanded specimen and 7—section; 8—dried specimen showing collapsed columnar structure and finely striate *Apophysis*; 9—weathered specimen with a flattened *Pedicel* and 10—side view of *Endoperidium* and *Pedicel*.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(1951a–b) and in the photographs of Staněk (1958) as *Geastrum striatum* DC. f. *striatum*.

The *Pedicel* is typically long but varies from circular to elliptical or oblong in cross section, from slender to thick and from equal to narrower in the middle with considerable variation being found within the same collection. The upper part of the *Pedicel* gradually broadens to form an upwards tapering *Apophysis*, which is usually inconspicuous. The surface of the *Apophysis*, i.e. the lower part of the *Endoperidium*, typically varies from striate to plicate although occasional specimens are met with a smooth surface. These corrugations are present beneath the columnar structure in freshly expanded specimens and are, therefore, not the result of shrinkage. As was pointed out by the author (1958) for *Geastrum vulgatum* Vitt., the *Apophysis* is due to the thick layer formed by the upper part of the *Pedicel* where it becomes the lower part of the *Endoperidium*.

The shape of the *Endoperidium* is typically depressed globose and it is not unusual to find the lower part hanging in lobes over the rigid upwards tapering *Apophysis*, where they frequently form a rim-like structure.

The *Capillitium* is usually given as having a similiar diameter as the *Spores*, i.e. 4–7 μ, but Eckblad (1955) gives measurements up to 9.5 μ, Staněk to 10.5 μ and the author finds that, whilst mainly under 10 μ, the threads may be as wide as 17.5 μ.

Spore dimensions are usually given as being within the range 4–7 μ but Bottomley (1948) records the dimensions 3.5–5.1 μ and Staněk (1958) 6–7.5 μ. The author's measurements are 3.6–4.5–6.2 × 3.6–4.5–5.5 μ without verrucae and 4.5–7.0–8.5 × 4.6–6.5–8.4 μ when the verrucae are included. Whilst most authors refer to the very coarse verrucae, their characteristic digitate structure appears to have been first remarked upon by Nečásek (1947). However, in all collections, many *Spores* have been observed collapsed, smooth or with part of their ornamentation missing. It would appear that the coarse verrucae are readily abraded and only *Spores* showing normal verrucae have been measured and the smooth or collapsed *Spores* have been omitted as being atypical.

In Europe, like most species of *Geastrum*, *G. pectinatum* is autumnal in occurrence, and freshly expanding peridia have been observed by the author from September to November. The species is typically found beneath conifers, especially *Picea excelsa*, but occasional collections have been made in other associations. *G. pectinatum* is not a frequent fungus in Europe, although Fries (1922) reported it to be not uncommon in Sweden, where it appears to have the most northerly distribution of the genus. The records indicate a calcareous habitat and Sandberg (1940) reported a collection under *P. excelsa* in Sweden with pH indices of 5.92 for the needle litter and 6.94 for the raw humus layer beneath.

GEASTRUM PLICATUM BERK.

BERKELEY'S SPECIMEN.—The type sheet in Herb. Kew bears a single specimen marked "*Geastrum plicatum* Berk. TYPE" followed by "*Geaster striatus* γ *plicatus* Klotzsch Madras Dr. Wight" and a long Latin description. The sheet is stamped "Herbarium Hookerianum 1867."

The single specimen has a non-hygroscopic *Exoperidium* measuring approximately 5.2 × 4.3 cm of the expanded rays, divided for almost half the radius into 7 broadly to narrowly acuminate rays, subdividing and often ragged at the tips, with the base arched. *Mycelial Layer* absent except for a few encrusted soil fragments. *Fibrillose*

Layer completely absent. *Pedicel* 6.5 mm tall, equal, circular in section. *Endoperidium* 8 × 14 × 12 mm, depressed globose, smooth, purplish-grey and coated with a fine buff farina. Base plane, with a rim-like *Apophysis* on the underside of which are deep, broad plications radiating outwards from the apex of the *Pedicel* and densely coated with the buff farinose deposit. *Mouth* sulcate, brown, heavily coated with the buff farina, seated in a depressed area but not clearly demarcated from the remainder of the *Endoperidium*, conical and up to 4.3 mm tall. *Columella* not examined as there was only a single specimen. *Gleba* dark brown. *Capillitium* brown, formed of simple threads about 1500 μ long with occasional thin side branches, particularly towards the tips, with maximum breadth varying from 4.9 μ to 10.5 μ and tapering to ca. 2 μ at the tips, thick-walled, encrusted and occasionally rather irregular. *Spores* brown, globose, contents obscured, 4.5–4.9–5.4 × 4.5–4.8–5.4 μ, with digitate, flat-topped verrucae, 5.9–6.7–7.3 × 6.3–6.6–7.1 μ.

Type locality: Madras, India.

BERKELEY'S DESCRIPTION OF GEASTRUM PLICATUM.—The original description of Berkeley (1839) reads:—

"*Geaster plicatus* Berk. *Geaster striatus*, γ *plicatus*, Kl. Mss. in Hook. Herb. Outer peridium soft, papyraceous, pale umber, smooth; laciniae about 7, acute; inner peridium seated on a long peduncle, globose, dark umber, smooth, strongly plicate at the base; orifice seated in a circular depression, conical, plicato-sulcate. Sporidia brown.

Madras. Dr. Wight. Nearly allied to *G. striatus*, β. *minimus*, but certainly distinct. The folds at the base of the inner peridium are very remarkable."

MATERIAL IN HERB. KEW UNDER GEASTRUM PLICATUM.—Besides the type specimen, there are three Ceylonese collections and one Australian collection determined as *G. plicatum* and there is also a Sudanese collection determined as *G. pectinatum* which requires treatment under this species.

(1) Labelled: "4593. *Geaster plicatus* Berk. Hakgala, May, 1913." Three weathered specimens with expanded *Exoperidia* up to 4.5 cm. *Fleshy Layer* completely absent and *Pedicel* up to 5 mm tall with the *Endoperidium* purplish-brown to grey, finely coated with white farina and a somewhat tubular *Mouth* merging with the surrounding *Endoperidium*. *Capillitium* 5.4–6.8 μ and *Spores* 4.9–5.3–5.7 × 4.9–5.1–5.7 μ, with broad, blunt verrucae, 6.5–7.1–8.2 × 6.2–7.0–7.5 μ.

(2) Labelled: "4471. *Geaster plicatus* Berk. Peradeniya, Dec. 1914." Two loose specimens with a maximum diameter of 6.5 cm for the expanded rays. *Fleshy Layer* absent and *Pedicels* tall (4 mm and 6 mm). *Endoperidium* purplish-brown with a fawn farinaceous deposit and a tall, conical *Mouth* which merges with the surrounding *Endoperidium*. *Capillitium* with a maximum diameter of 5.5–9.8 μ and *Spores* 3.8–4.2–4.6 × 3.6–4.1–4.6 μ, very coarsely verrucose, typically with a halo of digitate verrucae, 5.2–6.0–6.7 × 4.9–5.8–6.5 μ.

(3) Labelled: "*Geaster plicatus* Berk. No. 218. Hakgala. March, 1922." Four loose, rather small specimens with soil debris adhering to the *Mycelial Layer*. *Fleshy Layer* persisting in only one specimen as a dried-up creamy remnant with fragments around the *Pedicel* indicating that a columnar structure had originally been present. *Pedicel* up to 3.5 mm tall and tapering upwards into the *Endoperidium*. *Endoperidium* buffy-brown with a farinose deposit on the surface. *Capillitium* with a maximum diameter of 4.2–6 μ. *Spores* 3.6–4.4–5.2 × 3.6–4.3–4.9 μ, coarsely warted, often close and halo-like, 5.7–6.3–6.7 × 5.2–6.0–6.7 μ.

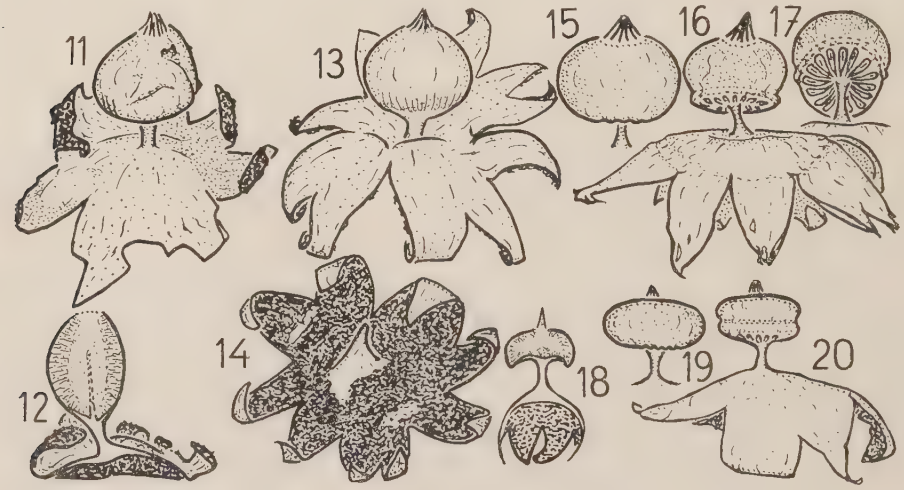
(4) Labelled: "*Geaster plicatus* Berk. Eidsvold, near Brisbane, Australia. Aug., 1913. Leg. *T. L. Bancroft.*" Single specimen measuring approximately 5 cm of the expanded rays. *Fleshy Layer* persisting as a fissured brown layer with the remains of a columnar structure at the

base of the *Pedicel* (5 mm tall) with the surface coated with a white, woolly or farinose deposit. *Endoperidium* purplish-brown, densely coated with the white deposit which also fills the plications of both the plane rim-like *Apophysis* and the tall, conical *Mouth*. *Capillitium* 6.8–10.1 μ and *Spores* 4.4–4.7–5.1 × 4.2–4.6–4.9 μ, typically with a halo of digitate verrucae, 5.1–6.6–7.1 × 5.1–6.4–6.7 μ.

(5) The following collection, whilst determined as *Geastrum pectinatum*, requires treatment under *G. plicatum*. J.T. 1972. Sudan Mycological Herbarium. On the ground, Kagelu. Leg. *J. K. Jackson*. 21 August 1951.

A loose, weathered *Peridium* with the *Fleshy Layer* absent. *Pedicel* 11 mm tall with a broadly upwards tapering *Apophysis* bearing deep, prominent plications up to 8 mm long. *Spores* with irregular digitate verrucae, 5.5–6.5–7.6 × 5.5–6.2–7.0 μ.

GEASTRUM PLICATUM BERK. IN LITERATURE.—In Australasia, Cunningham (1926) experienced difficulty in separating *Geastrum pectinatum*, *G. plicatum* and *G. bryantii*. He considered that they were better treated as subspecies distinguished by the base of the *Endoperidium* being smooth or slightly striate in *G. pectinatum*, plicate in *G. plicatum* and having a well-defined collar or ring in *G. bryantii*. Later (1944), he



Figs. 11–14. *Geastrum tenuipes* Berk.—Macroscopic 1 ×.

Figs. 11–12. Berkeley's specimens: 11—the only specimen still showing the *Mouth* characters; 12—section of a specimen.

Figs. 13–14. Cooke's specimen; 14—showing the peculiarly pointed base.

Figs. 15–20. *Geastrum plicatum* Berk.—Macroscopic 1 ×.

Figs. 15–17. Berkeley's specimen: 16—showing the *Endoperidium* contracted when desiccated; 15—"plumped out" after soaking; 17—the plicate base of the *Endoperidium*, i.e. the plane *Apophysis*.

Figs. 18–20. Hakgala collection in K (No. 218): 20—dried, weathered specimen showing *Endoperidium* contracted and 19—"plumped out" after soaking; 18—section of an expanded specimen.

referred to a collection of *G. plicatum* exhibiting both the collar of *G. bryantii* and the plicate base. Most authors regard *G. plicatum* as a synonym of *G. pectinatum.*

DISCUSSION.—The material examined differs from typical specimens of *G. pectinatum* by the plane base to the *Endoperidium* with the rim-like *Apophysis* bearing deep, broad plications beneath which radiate outwards from the apex of the *Pedicel* and are not decurrent. Otherwise the characters of these collections can be matched with those in various forms of European *G. pectinatum* and even the plane plicate *Apophysis* is similar to the structure found in the specimen of *G. pectinatum* collected at Mickleham, Surrey (LIVU 1129). Unless further evidence is forthcoming regarding the freshly expanded condition of this form, the author prefers to treat it as a synonym of *G. pectinatum.*

GEASTRUM TENUIPES BERK.

THE TYPE FOLDER IN HERB. KEW.—The sheet in the type folder bears five collections but only one of these can be considered to be authentic material. There is, however, a collection from Tasmania which may have been part of the original collection, and there is also a collection from Cuba which resembles the *G. tenuipes* type specimens. The remaining two collections are typical *G. pectinatum* and have been dealt with under that species.

BERKELEY'S SPECIMENS.—There are three specimens labelled: "*Geaster tenuipes* Berk. 1778. Tasmania. Gunn."

They are all damaged to some extent and only one specimen has a recognizable *Mouth. Exoperidium* non-hygroscopic, divided into six (two specimens) and seven broadly acuminate, ragged rays which tend to subdivide, extending halfway to the centre, recurved, with an arched base. Ray diameters varying from 3.5 cm to 4.3 cm. *Mycelial Layer* soil encrusted but absent in parts. *Fibrillose Layer* varying from flaccid to papery, buffy-ochraceous. *Fleshy Layer* consisting of a dried-up brownish layer, missing in parts, with no evidence of a columnar structure. *Pedicel* 3 × 1–1.6 mm, circular to elliptical in section. *Endoperidium* globose to obovate, buffy-ochraceous to brown with a slight purplish cast, 1.2–1.3 × 1.2–1.4 × 1–1.2 cm. Base gradually tapering upwards from the apex of the *Pedicel* and forming an inconspicuous *Apophysis* with the surface varying from faintly wrinkled to inconspicuously sulcate. *Mouth* (destroyed in two specimens) sulcate, conical, concolorous with the surrounding *Endoperidium,* with which it merges, and seated within a depressed area. *Columella* appearing to comprise a tall, thin, plate-like structure. *Capillitium* brown, simple, but with mainly short narrow side branches, mostly at the tips, 820 -1850 μ long, with maximum diameters of 5.7–7.6 μ, tapering to ca. 2 μ blunt tips, with the lumen indistinct. *Spores* brown, globose to subglobose, occasionally a single guttule seen, 4.1–4.6–5.0 × 3.6–4.5–4.9 μ, with close, irregular verrucae, 5.7–6.1–6.7 × 4.6–5.9–6.5 μ.

Type locality: Tasmania.

BERKELEY'S DESCRIPTION OF GEASTRUM TENUIPES.—The original description of *Geastrum tenuipes* Berk. in Berkeley (1848) reads:—

"*Geaster tenuipes* n.s.; peridio exteriore simplici multifido reflexo; interiore longe pedicellato ovato subtus leviter plicato; ore prominente conico plicato sulcato. Gunn. No. 1778. HAB. On the ground."

The species is frequently cited as having been published in the Flora Tasmaniae II (1860), which gives a figure.

FURTHER SPECIMENS IN HERB. KEW UNDER G. TENUIPES.—There are only two collections worthy of consideration.

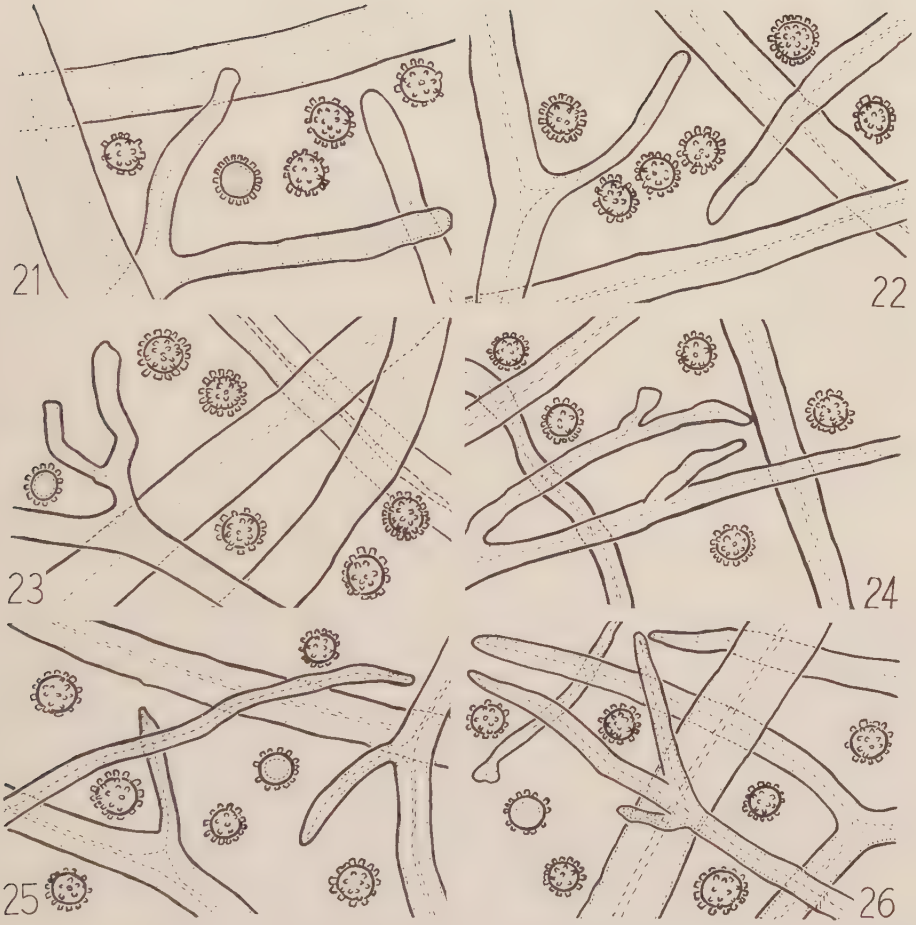
(1) A single specimen from Herb. Mycol. M. C. Cooke labelled: "*Geaster tenuipes*, B. Tasmania." The fungus is in very good condition but is somewhat weathered with only a few brownish remnants of the *Fleshy Layer* persisting on the ray surfaces. *Exoperidium* somewhat saccate, divided into 8 broadly to narrowly acuminate rays, 5 cm diameter of the expanded rays, with the base forming a thick, pointed, rooted structure. *Mycelial Layer* cream and heavily soil encrusted. *Fibrillose Layer* tough, creamy-ochraceous. *Fleshy Layer* comprising only a few brownish remnants persisting on the ray surfaces. *Pedicel* 3 × 1.2 mm, elliptical in section. *Endoperidium* 1.3 × 1.2 × 0.8 cm, obovate, buff above and purple to greyish below, where it is somewhat swollen into an *Apophysis* with a wrinkled to sulcate surface. *Mouth* sulcate, 2.5 mm tall, conical and merging with the surrounding *Endoperidium*, buff. *Gleba* brown. *Capillitium* brown, mainly simple, 1310–1950 μ, with very occasional narrow side branches, with maximum diameters varying from 5.2–7.8 μ, tapering to about 2 μ. *Spores* brown, globose, occasionally with a single guttule, 4.1–4.8–5.2 × 3.9–4.8–5.2 μ, with prominent but often irregular verrucae, 5.4–6.3–7.5 × 5.2–6.0–6.8 μ.

Whilst this specimen may possibly be part of the type collection, in view of the peculiar base, it seems preferable to regard it as being distinct. However, Plate 183, fig. 9 in Berkeley (1860) depicts a geaster closely resembling this specimen.

(2) Labelled: "694. *Geaster tenuipes* B. Cuba Wright (Curtis)". The fungus resembles the type collection of *G. tenuipes* but the *Endoperidium* is purplish-brown and the *Mouth* dark brown. *Pedicel* 5 mm tall. *Endoperidium* with a wrinkled sulcate base. *Mouth*, which is damaged, sulcate and merging with the surrounding *Endoperidium*. *Capillitium* maximum diameters 5.5–8.3 μ. *Spores* brown, globose, 4.6–4.9–5.6 × 4.2–4.8–5.4 μ, varying from regularly to irregularly verrucose with rounded, projecting verrucae, 5.6–6.5–7.7 × 5.6–6.3–7.5 μ.

GEASTRUM TENUIPES BERK. IN LITERATURE.—Lloyd (1905) referred *G. tenuipes* to *G. pectinatum*, and considered it to be smaller and intermediate between *G. pectinatum* and *G. plicatum*. Cunningham (1944) considered *G. tenuipes* to be a synonym of *G. plicatum*. Dennis (1953) referred Wright's collection from Cuba to *G. pectinatum*. In the most recent work on the Gasteromycetes, Staněk (1958) places *G. tenuipes* under *G. pectinatum* as a synonym.

DISCUSSION OF GEASTRUM TENUIPES.—The three collections can probably be referred to *Geastrum pectinatum* although they all differ from each other and from typical *G. pectinatum* in minor respects. The pale *Mouth* in the Tasmanian collections is unusual in *G. pectinatum* and more closely resembles that of *Geastrum nanum*, whose *Mouth* is typically dark brown, and the basal ridges and wrinkles of the *Endoperidium* differ from those normally found in *G. pectinatum* or the form called *G. plicatum*.



Figs. 21–26. *Spores* and *Capillitium.* Microscopic—1000 ×.

Figs. 21–23. *Geastrum pectinatum:* 21—Neotype in L; 22—L 939.334-18; 23—LIVU 1197.
Figs. 24–25. *Geastrum plicatum:* 24—Hakgala No. 218 in K; 25—Type in K.
Fig. 26. *Geastrum tenuipes:* Type in K.

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ON A VERNAL MARSH GALERINA

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(With 9 Text-figures)

A new species of *Galerina* is described, intermediate between Section *Physocystis* Smith & Singer and Section *Inocyboides* Singer.

In the course of the mycological investigation of the "Naardermeer", a famous marsh area near Amsterdam, a very curious *Galerina* was collected in spring in marshy coppices which mainly consist of *Alnus*. It proved to be not uncommon when searched for. From a study of the literature, it seems that the species is an undescribed and rather aberrant member of the genus. It is a pleasure to me to dedicate this species to Prof. Dr. J. Heimans of the Botanical Section of the University of Amsterdam, on the occasion of his 70th birthday, in honour of his important contributions to Science and to the protection of Nature.

Galerina heimansii W. Reijnd., *spec. nov.*

Pileo 4–8 mm lato, conico, dein irregulariter explanato, umbonato, glabro, plus minusve lubrico, hygrophano, pellucide striato-subsulcato, margine crenulato, in statu udo ochraceo, centro obscuriore, margine pallidiore, melleo. Lamellis distantibus, 13–16, adnatis vel rotundato-adnatis, lamellulis 1–2-ordinariis, fulvo-ochraceis. Stipite 15–20 × 0,6–1 mm, ad apicem melleo, deorsum obscuriore, basin versus subincrassato, parte basali subbulboso, fibrillis sparsis ornato. Odore saporeque raphanoideis. Sporis 8,2–10,5 × 4,8–6 μ, adhaerenter verrucoso-subtuberculatis, obscure ferrugineo-ochraceis. Basidiis bisporis. Pleurocystidiis numerosis, incrassatis, utriformibus, basi ventricosis, plerumque parte superiore constrictis, ad apicem late rotundatis, aetate saepius calyptra mucilaginea obtectis, 40–60 × 12–21 × 10–13 μ. Cheilocystidiis pleurocystidiis simillimis. Trama lamellarum subregulare, contexto hyphis pigmento ochraceo incrustatis, hyphis tenuibus fibuligeris.

In locis paludosis, vere. Typus in Herb. Lugd. Bat. (L 959.113–107).

Pileus 4–8(–10) mm across, conical with conspicuous small umbo, expanding and quickly becoming broadly convex, finally flat and often irregularly depressed around the umbo, hygrophanous, strongly translucently striate to sulcate up to the umbo, surface glabrous, somewhat lubricous, ochraceous tawny, centre tending to reddish brown, near edge honey colour, edge in youth showing veil remnants, soon irregularly crenulate and somewhat lacerate. Lamellae distant, (11–)13–16 reaching the stipe, 1–2 ranks of lamellulae, not regularly alternating, fulvous ochraceous, adnate to rotundato-adnate, convex, broad, edge fimbriate, faces pruinose; subcollariate, i.e. on expanding of the pileus becoming detached from the stipe, but remaining adherent to each other, leaving a star-like space between gills and stem. Stipe (10–)15–20 × 0.6–0.8(–1) mm, straight to sometimes strongly

curved, gradually enlarged towards the subbulbous base (up to 1.7 mm), honey colour with a reddish brown tinge, especially near the darker base, apex pruinose, surface covered with sparse yellowish fibrils from the veil, glabrescent with age; fibrils sometimes forming a ring-like zone, more densely coating the base. Flesh thin, watery-fragile, concolourous or slightly darker then the surface when moist, odour and taste distinctly raphanoid.

Spores 8.2–10.5 × 4.8–6 μ, ellipsoid to subamygdaliform, strongly warty, smooth plage absent (oil immersion) or else very indistinct, but suprahilar depression conspicuous, apical pore distinct, reddish brown in KOH solution (exactly the same colour as of spores of *G. marginata*). Basidia 2-spored, 20–23 × 5–7 μ, cylindrical but very often constricted near the apex, hyaline. Pleurocystidia very numerous, utriform, ventricose in lower part, apices broadly rounded, frequently constricted in the middle portion, 40–60(–70) × 12–18(–21) × 10–13 μ, at the constriction, if present, 6–8 μ wide, walls thickened, conspicuous in KOH solution (up to 1 μ), refractive, with age often covered with mucilage caps. Cheilocystidia similar to pleurocystidia, 35–55(–65) × 13–18 × (8–)10–13 μ. Trama of gills parallel or nearly so, encrusted with ochraceous brown pigment; trama of pileus hyaline to ochraceous with pigment incrustations; elements often narrowed in the middle part; clamp connections present but not frequent; caulocystidia of variable shape,

Figs. 1–9. *Galerina heimansii* W. Reijnd.: 1—carpophore × 2; 2—four sections [illegible]; 3—part of hymenophore of adult, expanded specimen to show the subcollaria [illegible] × 5; 4—pleurocystidia × 500; 5—cheilocystidia × 500; 6—spores × 2000; 7—basidia × 1000; 8—constricted elements of trama of lamellae × 500; 9—element of trama of pileus × 500 (from the type).

rarely utriform, mostly about cylindrical and often curved, up to 80 μ long; pleurocystidia not observed. Pellicle not differentiated.

Scattered to gregarious in marshy copses with *Alnus* and *Betula*, often mixed with *Salix*, in hollows of the litter, adhering to decaying leaves and fragments of stems of *Phragmites* and *Rubus* &c.

Material.—Noord-Holland: Naardermeer (between Naarden and Bussum); 27 May 1955, *WR 365*, eight specimens under *Alnus*, *Salix* and *Rubus*; 24 April 1956, *WR 419*, three specimens hidden in litter of *Alnus*; 3 May 1959, *WR 445* type; L 959.113-107), 15 specimens in litter of *Betula* and *Alnus*, several near buried, decaying *Sphagnum* but not growing on it.

This species is already in the field easily recognizable by its occurrence in marshy copses in spring, the small but conspicuous umbo, the subcollariate gills, and the raphanoid smell and taste, which is a quite typical combination of characters.

Microscopically the cystidia are very outstanding. On account of their distinctly thickened walls, which are refractive in KOH solution, and the mucilage caps, the species approaches the Section *Inocyboides* Singer, of which only two species seem to be known. *Galerina heimansii*, however, instead of having a crest of crystals as in the well-known *G. nana* (Petri) Kühner, shows an amorphous mass on their apices. Also, the spores are quite different from those of Section *Inocyboides* in that there is no smooth suprahilar plage.

On the other hand, *G. heimansii* is apparently near Section *Physocystis* Smith & Singer on account of its strikingly rounded pleurocystidia and cheilocystidia. The members of this group are only known from the western United States and South America. Some of the species described by Velenovský might belong here also, e.g. *G. minima* and *G. hydrocyboides*, if they are to be placed in the genus at all. It is evident that *G. heimansii* matches none of the species of Section *Physocystis* as mentioned in the Key which Smith and Singer prepared for their forthcoming monograph of the genus *Galerina*. Since Section *Physocystis* is not defined as having spores with a smooth plage, the species under discussion might be classified here. However, it differs from the members of this section, as far as they are known, by the thickened walls of the cystidia and their mucilage caps which, as already stated, are not unlike those of Section *Inocyboides*. Thus, the species seems rather aberrant and intermediate between the two sections mentioned; its position is as yet far from clear.

A curious feature of the present *Galerina* seems to be in the constriction of basidia, cystidia and many of the tramal elements, as shown in the figures.

Galerina heimansii seems to have been overlooked, probably on account of its hidden gro[illegible] under a thick layer (often up to four or five cm) of fallen leaves, [illegible]s of the litter. Of the nearly fifty specimens, collected in four seasons [illegible]ven different spots, only two or three could be detected without carefully [illegible]er. Besides, the species fructifies in spring when collecting in marshes is not very attractive, as very few agarics occur there at that time. Although it has not yet been found outside the "Naardermeer", the species should not be rare in similar surroundings elsewhere.

I am deeply indebted to Dr. A. H. Smith for sending me his unpublished Key to the genus *Galerina*.

Reference

SMITH, A. H., & SINGER, R. 1958. The genus *Galerina*: An outline of its classification. *In* Sydowia **11**: 446–453.

REVIEWS

URSULA K. DUNCAN, *A guide to the study of lichens.* (T. Buncle & Co. Ltd. Arbroath. 1959). Pp. xxvii + 164, 19 plates; price: 25 s.

Lichenology in Great Britain nowadays rejoices in increased activity and interest. This is evidenced by the foundation of the British Lichen Society which came into being some time ago, and now runs its own journal, The Lichenologist. The present book is another example, and it certainly appears at an appropriate time.

The book which is written in clear and simple language contains a few introductory chapters (on the structure of lichens, the use of reagents and apparatus, and on the ecology), keys to orders and families, a descriptive part, a bibliography, a glossary, and an index, followed by the plates.

The most important part, of course, is formed by the descriptions. As stated by the author, the classification and nomenclature are based on the views expressed by W. Watson in his works. This certainly reduces the possibility for students to become confused by a multiplicity of synonyms already at the outset. The author very wisely restricted herself to exemplifying each genus by one species only, leaving it to the perseverance of the reader to try to identify his collection on hand—in case of disagreement with that first example—out of a number of specific descriptions printed in small type. As soon as the beginner feels dissatisfied with the results and reaches for a more detailed work, he should realize that he has been guided to a higher level, which is exactly what this Guide is intended for.

There are a few items which are recommended for improvement in the next edition. Instead of adhering to a natural key, an artificial one should be tried based on the characters of the thallus. Considering the fact that so many lichens (the majority of the foliose and fruticose species, and quite a number of the crustaceous species) are found without apothecia, it is an unfortunate choice to base the key to the orders on the apothecial characters.

As far as the illustrations are concerned, a number of them would have gained in distinctiveness if the photographs had been taken at much closer quarters.

R. A. MAAS GEESTERANUS

Flora ČSR. B 1. Gasteromycetes. Houby břichatky. Edited by A. PILÁT, with the collaboration of K. CEJP, Z. MORAVEC, Z. POUZAR, V. J. STANĚK, M. SVRČEK, S. ŠEBEK, and F. ŠMARDA. (Nakladatelství Československé Akademie Věd. Praha. 1958.) Pp. 862, 257 text-figures; price: 87.50 Czech crowns, $ 12.22.

Many mycologists will envy Czecho-Slovakia's amazing wealth of Gasteromycetes to which the present volume bears testimony. But, however rich the fungous flora of a country, rather than its riches which in itself is of comparative value to non-residents, it is the way the constituent elements are treated taxonomically which makes it interesting. An even more important feature is the close collaboration of Czecho-Slovakia's foremost mycologists resulting in this impressive book which is an achievement worthy of admiration.

Taken in alphabetical order, the authors wrote the following contributions: K. Cejp—Nidulariales; Z. Moravec—Lycoperdales (Arachniaceae, *Disciseda*); Sclerodermatales (Tulostomataceae except *Tulostoma*); A. Pilát -general introduction; Phallales; Gautieriales; Gastrosporiales; Sclerodermatales (Pisolithaceae, Glischro-

dermataceae, Calostomataceae); index to authors in mycological taxonomy; index to general works on Gasteromycetes; index to Czech names; index to Latin names; Z. Pouzar—Sclerodermatales (*Tulostoma*); V. J. Staněk—Lycoperdales (Geastraceae); Sclerodermatales (Astraeaceae); M. Svrček—Hysterangiales; Hymenogastrales; Melanogastrales; S. Šebek—Podaxales; Lycoperdales (Mycenastraceae); Sclerodermatales (Sclerodermataceae); F. Šmarda—Lycoperdales (Lycoperdaceae).

Most families include or are preceded by a pertinent bibliography which no student can afford to overlook.

The greater part of the book (up to p. 702) is in the Czech language, followed by a part in Latin (pp. 703–827), presumably appended for the benefit of the foreign readers. The last named part is an unfortunate attempt to combine keys with specific descriptions, which nearly destroys the purpose of the keys. This part, being in Latin, also serves as a means of validating the publication of the numerous new taxa described in the Czech text. In some cases, however, no indication can be found in either text whether the taxon concerned is proposed as new, or has already been described on an earlier occasion (*Hymenogaster* sections *Lutei* and *Vulgares*; *Melanogaster* section *Microspori*).

Usually, recombinations have their new status indicated in both Czech and Latin texts (e.g. *Calvatia caelata* var. *hungarica* and *Lycoperdon perlatum* var. *excoriatum*), sometimes in the Czech text only (e.g. *Lasiosphaera gigantea* and *Lycoperdon perlatum* var. *albidum*), more rarely in neither (e.g. *Melanogaster* section *Ambigui*).

As a rule, the types of new taxa are clearly indicated, sometimes in the Czech as well as in the Latin part, where one expects to find this kind of information. In some cases, however, it is found to constitute a part of the explanatory text to a photograph (without further specification as to which of the specimens depicted is to be considered the actual type; Fig. 160 and Fig. 164), or it is omitted altogether (*Astraeus hygrometricus* f. *ferrugineus*).

The genus *Geastrum* is subdivided in a number of sections and subsections. The latter are composed not, as might be expected, of series but of stirpes, which term has no nomenclatural standing.

The above observations are mostly technicalities which, of course, do not detract from the utility of the work as a Flora, but considering the fact that the importance of this volume reaches far beyond the limits of a simple book for identification, a closer observance of the Rules would have been justifiable.

One of the important features is that the species described by Beck, Schwalb, and especially Velenovský are accounted for. It would also have been instructive to learn what was meant by *Bovista ochracea* Wettst., *Geaster stellatus* var. *paucilobatus* Wettst., or *Scleroderma chrysosporum* Opiz.

Another laudable feature is the great number of illustrations, which, for the rest, is characteristic of all Czech mycological publications. Yet, one would have welcomed in other genera as well such figures as are shown on p. 357, illustrating by comparison various species of the same genus. In some cases, one wonders whether quantity (Fig. 171) really contributes to a better recognizability of a species than does quality (Fig. 188). Recognition of species of the hypogeous genera would certainly have been facilitated by the inclusion of anatomical drawings.

As shown on more than one occasion in mycological literature, Gasteromycetes have a habit of suddenly cropping up in regions far from their native country. This may explain—there may actually be an explanation to this effect in the Czech text—why so many species and even genera never yet found in Czecho-Slovakia are included, especially among the Phallales.

Instead of maintaining the one genus *Calvatia* in the generally accepted, broad sense, it seems a wise solution to distinguish three genera, viz. *Calvatia* s. str.,

Vascellum, and *Lasiosphaera*. Of these, the second is a new genus, consisting of a single species, the correct name of which should be based on *Lycoperdon pratense* Pers. As far as *Lasiosphaera* is concerned, it is open to serious doubt whether this is the correct genus to accomodate what was previously known under *Calvatia gigantea*. *Lasiosphaera* is based on a single tropical species, *L. fenzlii*, which is characterized by the tenacity of the capillitium which persists long after the peridium has disappeared. Surely, this characteristic cannot be said to be applicable to *Calvatia gigantea*. The only genus to be used in this case is *Bovistaria* (Fr.) P. Karst.

R. A. Maas Geesteranus

A. Pilát, *Naše Houby. II. Kritické druhy našich hub.* (Nakladatelství Československé Akademie Věd. Praha. 1959.) Pp. 345, 160 coloured plates (by O. Ušák); price: 100 Czech crowns, $ 13.89.

This is the companion volume of a work of which the first was published seven years ago. Unfortunately, it is also the last one to appear. Illustrated works of such quality are regretfully rare, and further volumes would have eagerly been awaited.

The artist, O. Ušák, who died in 1957, had a good command of the difficult technique of painting fungi in watercolour, although his liking for a speckled rendering may be found to reach an excessive degree in some cases (Pl. 133).

The outstanding features of the book as an 'Iconographia' are the freshness and vividness of the colours, and the number of specimens of each species shown. The inclusion, however, of the spores does not seem very felicitous. They probably had better been removed to the opposite page, and augmented with such useful details as basidia, cystidia, and hyphae of pileus or velum.

As regards the species, it should be pointed out that they represent a random choice of the higher Basidiomycetes and Ascomycetes, with a marked preponderance of the Agaricales, but even in this group the number of illustrations bears no relation to the number of species of each genus concerned. Taking a group of closely related genera as an example, there is a striking lack of balance between the number of species depicted in *Cortinarius* (46) and that in the other genera such as *Inocybe* (3), *Hebeloma* (1), *Gymnopilus* (1, as *Pholiota spectabilis*), *Galerina* (0), and *Naucoria* (0).

It is to be regretted that a book of this kind has been chosen as a means of publishing taxonomical novelties. Surely, one would expect Česká Mykologie to be the appropriate place for the publication of a new species (*Cortinarius undulatofibrillosus* Pilát, Pl. 101 fig. b; no type indicated), a new name (*Tricholoma radotinense* Pilát & Charvát, Pl. 64), a new variety (*Boletus purpureus* var. *le-galiae* Pilát, Pl. 4), or a new combination [*Tricholoma virgatum* var. *sciodes* (Secr.) Pilát, Pl. 69]. Whether *Agaricus squamuliferus* var. *caroli* (Pilát) Pilát is a new transfer I have not been able to find out. If it is, it is not validly published as it lacks any reference to its basinym. It would have been more correct if, in the case of *Clavulina cinerea*, Corner had been cited as the second author of var. *odorata*, var. *gracilis*, f. *subcristata*, and f. *sublilascens* (Pl. 154 fig. a). Important information is to be gained by consulting the synonyms, as in a number of cases Velenovský's species are involved. The index of Latin names at the end of the book (pp. 336–345) is well thought out, facilitating the orientation in both volumes. There is no doubt that the translated edition of this second volume will also be looked forward to by anyone interested in the higher Fungi.

R. A. Maas Geesteranus

Instructions to authors

Papers should be submitted typewritten and double-spaced throughout, preferably without any underlining and without the use of capitals to indicate particular letter-press. Illustrations to be included on textpages should be consecutively numbered throughout a paper using arabic numbers. The explanation to the illustrations should be appended to the manuscript.

Titles of journals and other publications are abbreviated mainly in accordance with the "International Code of Abbreviations for Titles of Periodicals," and to "A World List of Scientific Periodicals", 1952.

In matters of botanical nomenclature close adherence to the "International Code of Botanical Nomenclature" is observed.

CONTENTS

Preface by H. J. LAM v
J. A. VON ARX: Über die Ascomycetengattung *Plochmopeltis* Theiss. 1
K. B. BOEDIJN: Notes on the genus *Sarcosoma* 7
——: The genus *Actiniceps* Berk. & Br. 11
——: On a new family of the Sphaeriales 15
——: A species of *Septobasidium* shedding its immature basidia 21
M. A. DONK: Notes on 'Cyphellaceae'.—I 25
R. A. MAAS GEESTERANUS: Sur un *Hydnellum* méconnu 111
——: The stipitate Hydnums of the Netherlands—IV. *Auriscalpium* S. F. Gray, *Hericium* Pers. ex S. F. Gray, *Hydnum* L. ex Fr., and *Sistotrema* Fr. em. Donk 115
J. T. PALMER: Observations on Gasteromycetes—VIII. Persoon's specimens of *Geastrum pectinatum* Pers. and a reassessment of *Geastrum plicatum* Berk. and *G. tenuipes* Berk. 149
W. J. REYNDERS: On a vernal marsh *Galerina* 165
Reviews 169

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